

# **FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME**

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## **BASIC ASSESSMENT PROCESS FOR THE PROPOSED IRT PHASE 2A TRUNK ROUTE: PORTION E1, 3.5KM OF GOVAN MBEKI ROAD FROM INTERSECTION WITH HEINZ/OTTERY ROAD TO APPROX 130 EAST OF LINK ROAD, MANENBERG & GUGULETHU**

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### **NOTE:**

This is the Final EMPr for the proposed scope of works. The Draft EMPr was subject to public review. Where changes have been made to the Draft EMPr following public review, these have been underlined for ease of reference.


This EMPr should be further updated to:


- Incorporate conditions and specifications imposed by the Department of Environmental Affairs and Development Planning if Environmental Authorisation is granted;
- Incorporate conditions and specifications imposed by the Department of Water and Sanitation as part of the General Authorisation;
- Reflect the final approved Road Upgrade Plans/ detail design (for the route and the Lotus Canal);
- Reflect the final approved Stormwater Management Plan;
- Reflect the final approved Landscaping Plan; and
- Incorporate conditions and specifications imposed by the Local Authorities as part of the Town Planning exercise, if applicable.

Such updates must occur without the need for a formal approval process and must be undertaken by a qualified Environmental Assessment Professional.

This EMPr must be incorporated into all tender and contract documentation.

## DOCUMENT CONTROL SHEET

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## ACRONYMS

For the purposes of this document the following acronyms shall apply:

<b>BRT</b>	Bus Rapid Transit
<b>CBA</b>	Critical Biodiversity Area
<b>CCT: ERM</b>	City of Cape Town: Environmental Resource Management
<b>CCT: TDA</b>	City of Cape Town Transport and Urban Development Authority
<b>DEA&amp;DP</b>	Department of Environmental Affairs and Development Planning
<b>DWS</b>	National Department of Water and Sanitation
<b>EAP</b>	Environmental Assessment Practitioner
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EMPr</b>	Environmental Management Programme
<b>EO</b>	Environmental Officer
<b>ESA</b>	Ecological Support Areas
<b>ESNR</b>	Edith Stephens Nature Reserve
<b>GA</b>	General Authorisation
<b>HWC</b>	Heritage Western Cape

Compiled by Chand Environmental Consultants

Final EMPr for the proposed IRT Phase 2A Trunk E1 Expansion of Govan Mbeki Road  
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<b>LC</b>	Least Concern
<b>LED</b>	Light Emitting Diode
<b>NEMA</b>	National Environmental Management Act
<b>NMT</b>	Non-Motorised Transport
<b>NHRA</b>	National Heritage Resources Act
<b>OESA</b>	Other Ecological Support Areas  (Old agricultural lands or otherwise disturbed areas, of fairly low biodiversity value, although they do have some ecological connectivity value. They are not Critical Biodiversity Areas, but do help support the functionality and viability of nearby CBAs)
<b>ONV</b>	Other Natural Vegetation
<b>SACNASP</b>	South African Council for Natural Scientific Professions
<b>SAHRA</b>	South African Heritage Resources Act
<b>TP</b>	Total Phosphorous
<b>TSS</b>	Total Suspended Solids
<b>VOC</b>	Volatile Organic Compounds



## DEFINITIONS

For the purposes of this document the following definitions shall apply:

**Affected Environment:**

Those parts of the socio-economic and biophysical environment impacted on by the development

**Batch plant:**

Site for the large-scale mixing and production of concrete or plaster, and associated equipment and materials.

**Bund:**

Enclosure under / around a storage facility to contain any spillage.

**Building and demolition waste/" builder's rubble":**

Waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition, which include: (a) discarded concrete, bricks, tiles and ceramics, (b) discarded wood, glass and plastic, (c) discarded metals, (d) discarded soil, stones and dredging spoil, (e) other discarded building and demolition wastes" (DEA&DP, 2018)

**Contractor:**

The principal persons /company undertaking the construction of the development.

- The main contractor as engaged by the developer;
- Selected subcontractors; and
- Any other contractor from time to time engaged by the developer directly in connection with the construction part of the works.

**Contaminated water:**

Means water contaminated by the contractor's activities, e.g. concrete water and runoff from plant/personnel wash areas.

**Construction camp:**

Means the area designated for all temporary site offices, storage sheds and areas, parking areas, maintenance workshops, staff welfare facilities, accommodation, etc.

**Construction Environmental Management Programme (EMPr):**

The construction phase Environmental Management Programme, containing the environmental specifications for civil and building works, also forming part of the civils and building contract documentation.

**Engineer:**

A person representing the developer on site and who is responsible for the technical and contractual implementation of the works to be undertaken. This is usually the engineer,

but may be any other person, such as an architect or project manager, authorised by the developer to fulfil this role.

**Environment:**

Means the surroundings within which humans exist and that are made up of the land, water and atmosphere of the earth:

- micro-organisms, plant and animal life;
- any part or combination of the above and the interrelationships among and between them; and
- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Environmental Education Programme:**

An environmental education course for the contractor's management staff and labour force, which informs them of the requirements of the EMPr. The ECO will present and co-ordinate courses.

**Environmental Control Officer (ECO):**

The individual or company appointed by the developer to ensure the implementation of the EMPr and suitable environmental management practices on site for the duration of the construction phase of the project.

**Environmental Impact Assessment (EIA):**

A process of collecting, analysing, interpreting and communicating data as it pertains to possible impacts (positive and negative) upon the environment due to a development.

**Environmental Officer (EO):**

The person appointed by the Contractor to ensure implementation of the EMPr on site.

**General waste:**

Means waste that does not pose an immediate hazard or threat to health or to the environment, and includes:

- a) domestic waste;
- b) building and demolition waste;
- c) business waste;
- d) inert waste; or
- e) any waste classified as non-hazardous waste in terms of the regulations made under section 69 (of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM: WA)), and includes non-hazardous substances, materials or objects within the business, domestic, inert, building and demolition wastes as outlined in schedule 3 (of the NEM:WA) (NEM:WA, 2008).

**Hazardous waste:**

Means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles as outlined in schedule 3 of the NEM:WA (NEM:WA, 2008) (DEA&DP, 2018).

**Heritage Western Cape (HWC):**

The statutory provincial body responsible for heritage resource management, in the Western Cape.

**Method Statement:**

A written submission by the contractor to the engineer and ECO in response to the specifications or a request by the engineer, setting out the plant, materials, labour and method the contractor proposes using to carry out an activity, identified by the relevant specification or the engineer when requesting the Method Statement, in such detail that the engineer is enabled to assess whether the contractor's proposal is in accordance with the specifications and/or will produce results in accordance with the specifications.

The Method Statement shall cover applicable details with regard to:

- construction procedures,
- materials and plant to be used,
- getting the plant to and from site,
- how the plant/ material will be moved while on site,
- how and where material will be stored,
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- timing and location of activities,
- compliance/ non-compliance with the specifications,
- any other information deemed necessary by the engineer.

**Mitigation:**

The implementation of practical measures to reduce adverse impacts

**No Go Areas:**

Areas identified as being environmentally sensitive in some manner and delineated on plan, and on the site with pegs or fencing and which are out of bounds to unauthorised persons. Authorisation must be obtained prior to entry.

**Potentially hazardous substance:**

Is a substance, which, in the reasonable opinion of the engineer, can have a deleterious effect on the environment.

**Reasonable:**

Means, unless the context indicates otherwise, reasonable in the opinion of the engineer after he has consulted with a person, not an employee of the Employer, suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in the National Environmental Management Act (No. 107 of 1998)).

**Site:**

The boundary and extent of development works and infrastructure, including any areas off the main site on which works are to be carried out in order to allow the development to proceed successfully.

**Solid waste:**

Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

**Specification:**

A technical description of the standards of materials and workmanship that the contractor is to use in the works to be executed, the performance of the works when completed and the manner in which payment is to be made.

**Top material:**

This refers to any surface material in the construction area, whether it is soil, fine material or stones including vegetation.

**Topsoil:**

Means the top 100mm of soil and may include vegetation and rocks.

**Waste management hierarchy:**

A model that aims to prevent, reduce and manage waste through encouraging waste avoidance first and then the reduction, reuse, recycling and disposal of waste and is presented in the form of a pyramid. If the hierarchy is implemented it will assist in the reduction of greenhouse gas emissions, reduce potential pollutants, save energy, conserve resources, create jobs and stimulate the development of green technologies (DEA&DP, 2018).

**Works:**

The construction operations and all related and incidental works, such as site works, earthworks, installation of services, rehabilitation etc., in connection with the execution and carrying to completion of the development.

**Table 1 Checklist for Report Contents against the Requirements of Appendix 4 of GN No. 326 of 7 April 2017**

NO	REQUIREMENTS:	INCLUDED IN REPORT:	SECTION REFERENCE
a	Details of the EAP who prepared the report, including the expertise of the EAP, including a curriculum vitae.	✓	Document Control Sheet
b	A detailed description of the aspects of the activity that are covered by the EMP as identified by the project description;	✓	1.2
c	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	✓	1.2 0
d (i)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	✓	1.4  3

	Planning and design;		
(ii)	Pre-construction activities	✓	3 3.3
(iii)	Construction activities;	✓	3 3.3
(iv)	Rehabilitation of the environment after construction and where applicable post closure; and	✓	3.3
(v)	Where relevant, operation activities.	✓	4
(f) (i)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to-  Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	✓	3.2 3.3 3.4
(ii)	Comply with any prescribed environmental management standards or practices;	✓	1.5
(iii)	Comply with any applicable provisions of the Act regarding closure, where applicable; and	NA	
(iv)	Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	NA	
g	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f)	✓	2.2 2.3
h	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	✓	2.2 2.3 2.4
i	An indication of the persons who will be responsible for the implementation of the impact management actions;	✓	2.2
j	The time period within which the impact management actions contemplated in paragraph (f) must be implemented;	✓	2.2 2.3 3.2
k	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	✓	2
l	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	✓	2.3
m (i)	An environmental awareness plan describing the manner in which-  The applicant intends to inform his or her employees of any environmental risk which may result from their work; and	✓	2.6
(ii)	Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	✓	2.6

n	Any specific information that may be required by the competent authority.	NA
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# 1. INTRODUCTION

## 1.1 BACKGROUND & SITE LOCATION

Phase 2A of the City of Cape Town's MyCiTi IRT System operates along the Lansdowne-Wetton Corridor which currently carries in the order of 50% of all road-based public transport trips within the City. The proposed project for Phase 2A is to link the south-eastern suburbs of Cape Town (Metro- Southeast) with nodes along the Southern Suburbs rail line. The two principal trunk routes will operate between Mitchells Plain and Claremont and Khayelitsha and Wynberg and consists of both trunk and feeder services.

The focus area of the project comprises of the proposed upgrades to Govan Mbeki Road / M9 from the corner of Heinz/Ottery Road to just beyond Link Road approximately 3.5 km to the east. Refer to Figure 1 below for the location of the stretch of road. This section of road passes the Edith Stephens Nature Reserve (ESNR) to the south and the Lotus Canal to the north, as well as a sensitive biodiversity area to the north just after the Duinefontein Road intersection.



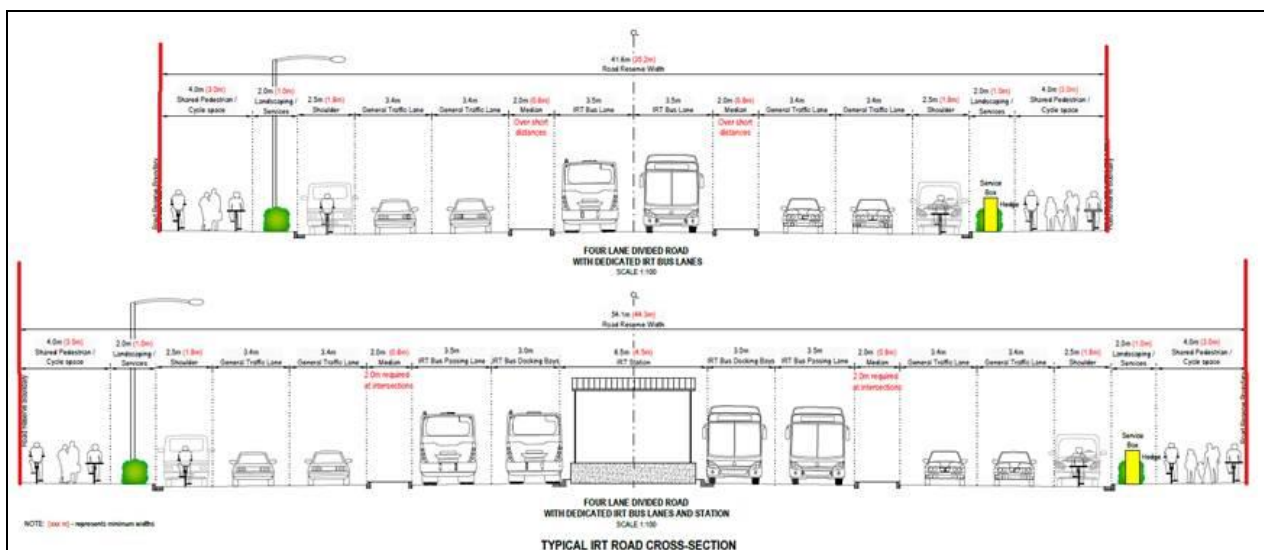
Figure 1: Locality Map

## 1.2 PROJECT SCOPE

The proposed scope includes the following:

- Up to four dedicated bus lanes;
- Groundworks in the centre of certain points along the route for future construction of a bus station (note that this would only be at certain points throughout the route where they are required in terms of logistics and availability of space);
- General traffic lanes, typically comprising of four lanes (two in either direction);
- A road shoulder;
- A strip for landscaping and service (e.g., streetlights) installation; and
- A sidewalk for pedestrian and cyclist use (i.e., Non-Motorised Transport- NMT- lanes).

Figure 2 depicts typical cross sections of the proposed road. The detailed design of the cross-section throughout the route will occur in the future and it is important to note that it may differ slightly from one section of the route to the next. The nature of the cross-section would be determined by constraints on the ground. The cross section applied (i.e., that with a bus station versus that without a bus station) would depend on the logistic requirements in terms of where bus stations are needed as well as whether or not there is sufficient space available for the construction of the foundation for a station. Note that, with regard to the bus stations, only the foundation works would be carried out as part of this proposed development. The bus stations themselves would be constructed at a later stage, under a separate tender process.



**Figure 2: Typical cross-sections of the envisioned road upon completion. Note that the bottom cross section indicates those points for which the foundation for bus stations would be included. (figure provided by Gibb (Pty) Ltd)**

The proposal would also entail an elevated road link at the Govan Mbeki Road/ Duinefontein Road intersection. Refer to Appendix 3 for a draft plan. Note that this is merely a draft drawing indicative of the intention which may change slightly during detail design but would remain within the maximum footprint applied for.

The proposed new bus (Bus Rapid Transit-BRT) lanes to be included within the existing carriageway would be reserved for the exclusive use of the MyCiTi buses which will be serviced by a new fleet of vehicles. Other vehicles, such as heavy vehicles, taxis, Golden Arrow Buses, and passenger vehicles, will not be permitted on the BRT-lanes and will remain on the general traffic lanes of the existing carriageways.



Note that the exact design would change during the detail design phase, however the final design would remain within the footprint applied for.

Refer to Figure 3 for a detailed route map which illustrates the proposed expansion as well as the location of the road reserve for the preferred alternative (i.e., Alternative 3). Generally, all the proposed works would take place within the road reserve, however, there are a few portions which would occur beyond the road reserve. The preferred road geometry (i.e., development footprint) extends up to 15m either side of the existing road shoulder, but is significantly narrower for the portion along ESNR, in order to avoid encroachment beyond the road reserve and into the ESNR.



**Figure 3: Route map for Preferred Alternative 3 (source: GIBB, 2021)**

**Note that an envelope/development footprint is applied for with variations of the cross-sections and plans depicted in Figure 2 to be designed during the detail design phase. It is believed that considering a development envelope is appropriate for this proposed development (essentially expansion of a road) as the land use (i.e., a road) remains consistent throughout the extent of the footprint. The Applicant will engage with each property owner outside of the Basic Assessment process (i.e., during the detailed design phase) in order to reach an appropriate agreement among all parties for the best use of the land. The proposed development, therefore, may not extend to the full provision of the proposed footprint in certain areas.**

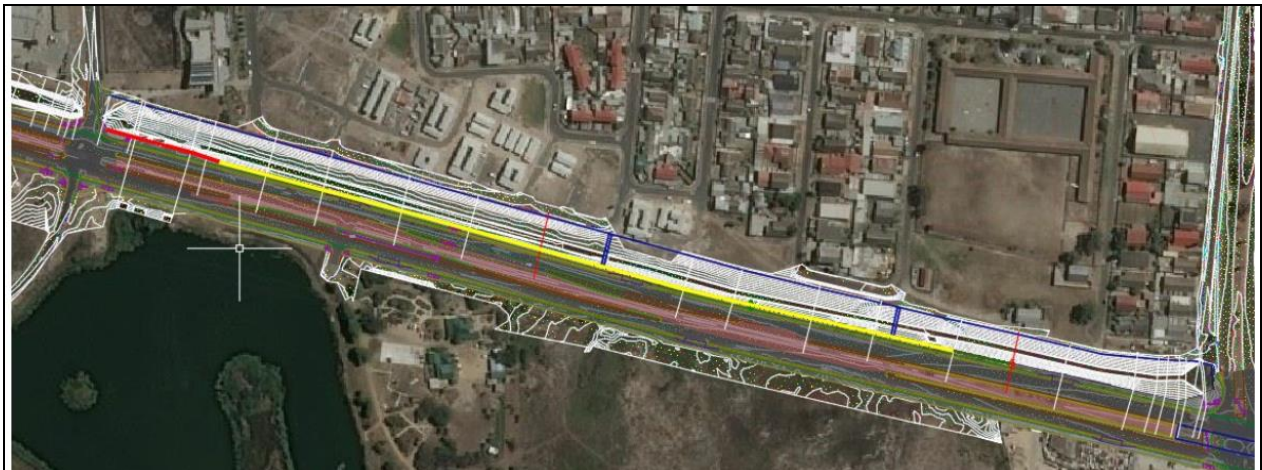
**This EMPr is to be updated with the detailed designs once they are approved.**

#### **Proposed Works at the Lotus Canal:**

The existing Lotus River canal is a trapezoidal channel with a small concrete low flow at its invert (Gibb, 2021). Although the existing Lotus Canal generally has capacity to convey the 1 in 50-year return, there are a number of low points along the southern embankment of the Lotus Canal which would allow flooding into the existing Govan Mbeki Road (Gibb, 2021).

In terms of the proposed cross-section, the pedestrian/cycle lane/sidewalk component of the proposed upgrades would encroach into the Lotus Canal by approximately 3 m, but the encroachment thereof would extend further, between 3 m and 6m at two points (refer to Figure

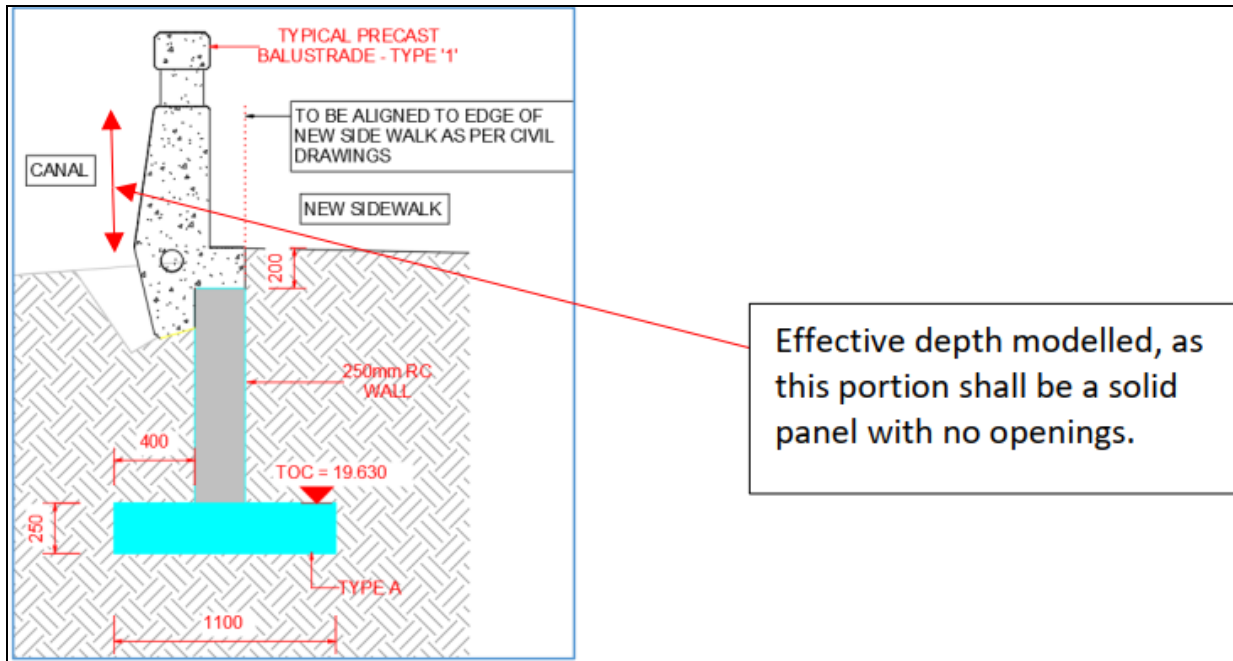
4) (Gibb, 2021). Note that this would also expand over three existing outtake culverts opposite Edith Stephens Nature Reserve, and the culverts would be left as is (Gibb, 2021).



**Figure 4: Encroachment into the Lotus Canal (yellow indicates where the proposed sidewalks would encroach by approx. 3 m and the red reaches indicate where encroachment would be up to 6 m), the first nearby the Edith Stephens Wetland Nature Reserve and the second under the upstream pedestrian bridge (source: GIBB, 2021)**

A new retaining/flood protection wall (approx. 250 mm wide with height ranging up to 2 m high depending on existing slope) is proposed at specific low points identified along the Lotus Canal (which would stretch along the majority of the Lotus Canal adjacent to E1, west of the Duinefontein Intersection), along the southern bank thereof. As per the encroachment described above, some segments of the proposed wall would be located within the existing channel profile (generally 3 m in, but this would extent to approximately 6 m for a short reach as indicated in Figure 4) (Gibb, 2021). These retaining walls would be sufficient to prevent overtopping from the Lotus Canal onto Govan Mbeki Road. Note that existing culverts would be retained in their current state (Gibb, 2021).

The typical section for the proposed retaining wall includes a reinforced concrete wall with a concrete footing (Gibb, 2021). The concrete wall would end 150 mm below the walkway level, and a concrete balustrade (refer to Figure 5) would be bolted onto this wall (Gibb, 2021). The purpose of the concrete balustrade would be to protect vehicles from leaving the road and crashing into the Lotus River Canal (i.e., to provide a crash barrier), however it is worth noting that the lower portion of the concrete balustrade would consist of a solid wall, with structural joints located 4 m c/c (Gibb, 2021). The wall would be watertight (unless vandalism removes the joints between the balustrades) (Gibb, 2021). An alternative design may be employed which would comprise a solid concrete balustrade with a suitable waterstop, but this would be resolved at detail design, noting that the typical cross section and function would apply either way (Gibb, 2021). The proposed retained wall would run along the reach between Duinefontein Road and Vygekraal Road (ending around 200 m west of Duinefontein Road); but its function would be only to carry out the function of a crash barrier where the Canal does not overtop the southern embankment and inundate Govan Mbeki Road in the existing scenario (Gibb, 2021).



**Figure 5: Proposed concrete balustrade and stormwater modelling applied (source: GIBB, 2021)**

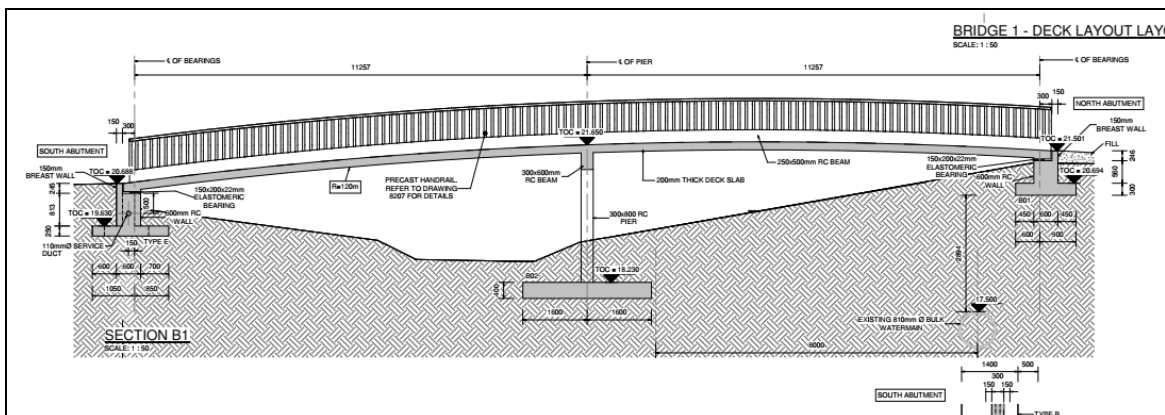
Note that no volumetric increase in the channel section is proposed as it is not deemed necessary (Gibb 2021).

Two existing pedestrian bridges across the canal would also be reconstructed and would each be supported by a single central pier, the footing of which would be construction within the Lotus Canal (Gibb, 2021). They would not, however, be replaced in their exact current footprint, but would be located slightly to the west thereof. The existing bridges would be retained in order to allow for them to remain operational during the construction phase, after which they would then be demolished (Gibb, 2021). Refer to Figure 6 for the location thereof and to Figure 7 and Figure 8 for the cross section of each.

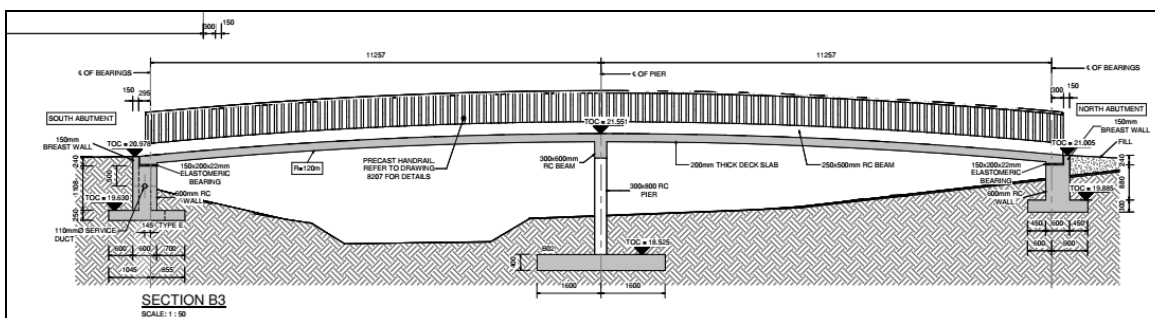




**Figure 6: Location of Bridges- Existing and Proposed (created by EAP using Google Earth Pro and layers from GIBB, February 2021 and Belcher, Grobler & Barrow, 2021 in April 2021)**



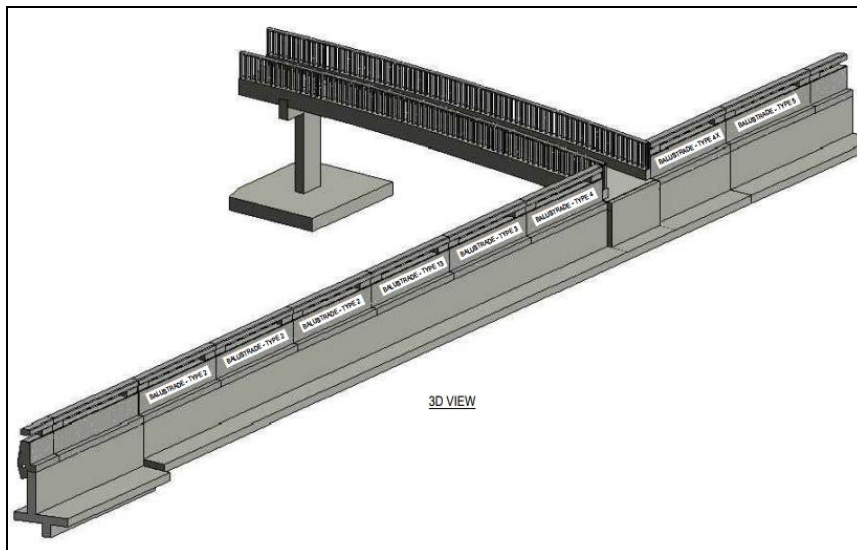
**Figure 7: Bridge 1 Cross-section (source: Gibb, 2021)**



**Figure 8: Bridge 2 Cross-Section (source: GIBB, 2021)**

Because it would be located within the existing flooding area, the upstream bridge would also have a short-arched wall that would tie into the proposed concrete balustrade and the wall would cater for the 1 in 50-year water level (Gibb, 2021). The lower bridge would not require the

additional wall because it would not be prone to existing flooding. Refer to Figure 9 for a 3D render of a section of the proposed retaining wall, a pedestrian bridge, as well as how they would tie-in to each other (Gibb, 2021).



**Figure 9: 3D View of Typical Bridge and Retaining Wall (source: GIBB, 2021)**

The stormwater management plan concludes that the proposed retaining wall would have a minimal effect on the Lotus River Canal.

### **Stormwater:**

It is proposed to construct a new minor stormwater drainage system to serve Govan Mbeki Road as part of the proposed development. This system would either tie into the existing minor stormwater drainage system or have new inlets into the Lotus River Canal constructed.

Gibb (2021) confirms that the stormwater drainage system has been designed as follows:

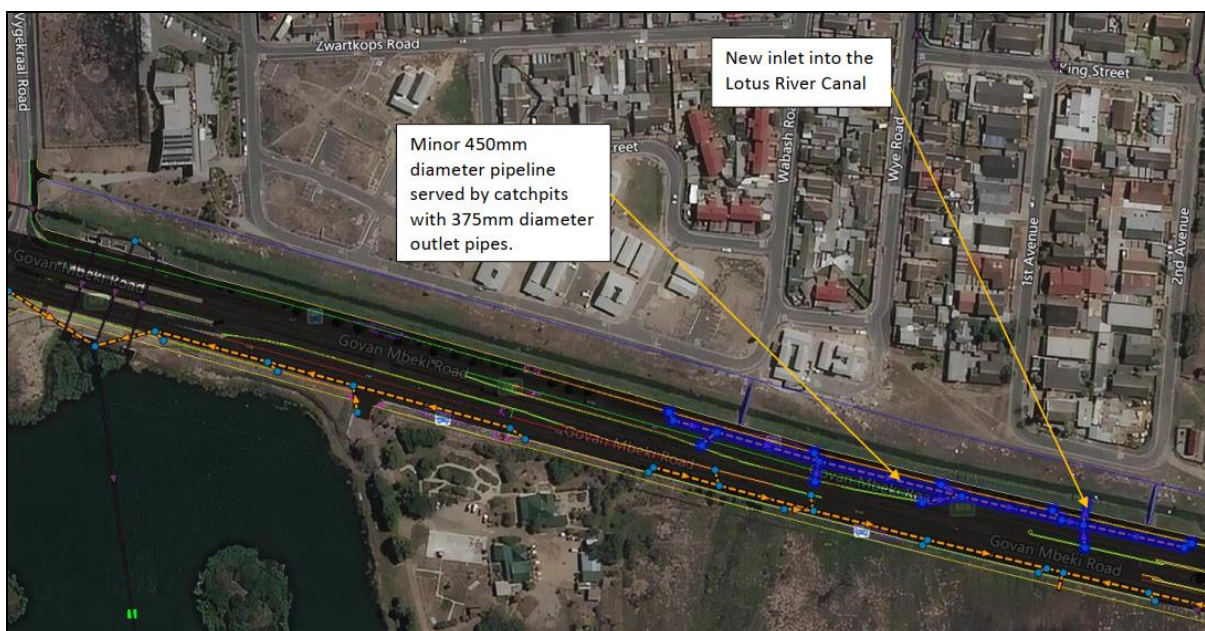
- The minor stormwater drainage system shall convey at a minimum a 1 in 10-year return period.
- A minimum 375 mm diameter pipe shall serve the catchpits, and 450 mm diameter pipes shall connect manholes. Due to the relatively small contributing catchments, the hydraulic assessments found that the minor stormwater drainage system would be able to convey greater than the 1 in 10-year return period.
- The road would convey up to- and including- the 1 in 50-year return period.

The system would comprise a series of underground pipelines to convey the stormwater from the road into existing stormwater lines, or to catchpits and then to 375 mm diameter outlet pipes, which would daylight into the Lotus Canal (Gibb, 2021). The stormwater drainage systems discharging into the Lotus River Canal are shown in Figure 10 and Figure 11.





**Figure 10: Proposed Minor Stormwater Drainage System (1) (source: GIBB, 2021)**



**Figure 11: Proposed Minor Stormwater Drainage System (2) (source: GIBB, 2021)**

Note that no stormwater upgrades/works would occur within the Edith Stephens Nature Reserve.

This EMPr is to be updated with the final approved Stormwater Management Plan (as approved by City of Cape Town Stormwater and Catchment Management branch).

There would be no requirements for bulk services as the proposed development is the expansion of an existing road. With respect to streetlights, existing lights would be replaced with Light Emitting Diode (LED) lights, which require less energy.

### **Landscaping:**

Landscaping would be carried out beyond the basic rehabilitation and clearing requirements indicated in this EMPr. Landscaping would entail a combination of planting of grasses, trees, groundcovers, and paving (OVP, 2018). In more high traffic areas, there would be a

combination of pedestrian crossings (i.e., informal, painted) as well as some resilient urban elements such as concrete seat walls (OVP, 2018). There would also be some larger palms as well as rock and stone fields for space-defining elements (OVP, 2018). At the larger nodes, the aforementioned elements would also be included (OVP, 2018).

The draft Landscaping Plan is included in Appendix 5. The final Landscaping Plan must be approved by the City of Cape Town before landscaping commences on site and the final plan included in this EMP.

### **Alternatives:**

Along with the no-go alternative, three road geometry alternatives have been assessed through the Basic Assessment Process, namely:

**Alternative 1-** Unconstrained alternative (15 m expansion from road shoulder on either side);

**Alternative 2-** Proposed Design 1 (a much narrower design in response to a high-level baseline study conducted by specialists, which does not allow room for optimal road design); and

**Alternative 3-** Proposed Design 2 (this is the **preferred** expansion width designed in response to detailed specialist assessments and mapping of sensitivities on the ground which provides as much room as possible for optimal road design, i.e., up to 15 m either side the road shoulder with narrower areas in response to environmental sensitivities).

### **Listed Activities in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA):**

With respect to the Listed Activities triggered, the following aspects of the proposed development, preferred alternative (i.e., Alternative 3) are important:

- Approximately 100 m<sup>2</sup> of Cape Flats Dune Strandveld, approximately 400 m<sup>2</sup> of Cape Lowlands Freshwater Wetlands, and approximately 200 m<sup>2</sup> of Cape Flats Sand Fynbos would be cleared, however the state of vegetation in these areas is highly degraded or completely transformed (Altern, 2021), therefore Listed Activities in this regard may not be triggered, but this is not an absolute certainty, so the associated Listed Activities have been applied for and assessed as per the precautionary principal.
- Although the proposed development touches on a number of “waterbodies”, the large majority of these are stormwater/ attenuation facilities which have resulted from run-off from Govan Mbeki Road and they have no ecological value (Belcher *et al*, 2021). The only area of significance is that infilling in approximately 750 m<sup>2</sup> of the wetland mapped along the fringe of ESNR would be required as well as works within the Lotus Canal for the pedestrian bridges and retaining wall (refer to Table 2 for a summary of the extent to which the Lotus Canal and wetlands would be disturbed for each alternative). Note that the wetland has been mapped to extend beyond the cadastral boundary of the reserve and into the road reserve. This is the area that would be encroached upon as part of the proposed development and not the ESNR currently within the cadastral boundaries. The ESNR is protected in perpetuity in terms of the National Environmental Management: Biodiversity Act (No. 10 of 2004).
- In certain areas, the proposed expansion/ road widening would occur beyond the road reserve and greater than 4 m into Public Open Space.

**Table 2: Watercourses identified along the route of the proposed development, including the extent to which they would be filled in where applicable**

Freshwater Resource	Extent of Encroachment (in m <sup>2</sup> )	Clarification notes
<b>Lotus Canal</b>	<b>Alternative 1 &amp; 3: 14,400</b>  Alternative 2: Zero and no construction at the canal	The low flow channel of the canal is located within a concrete canal and thus the watercourse has little ecological functionality within this section. The ecological impacts of the proposed alterations to the canal to allow for the widening of the road would be low and can be mitigated (Belcher <i>et al</i> , 2021).
<b>Wetland 1</b>	Alternative 1: 1000  Alternative 2: 11  <b>Alternative 3: None</b>	Wetland 1 is a seasonally inundated mixed sedge/grass depression wetland that is of a relatively low ecological importance and a portion thereof within the road reserve would be lost (Belcher <i>et al</i> , 2021).
<b>Wetland 2</b>	Alternative 1: 250  Alternative 2: None  <b>Alternative 3: None</b>	Wetland 2 is a seasonally inundated grass/sedge wetland of low ecological importance (Belcher <i>et al</i> , 2021).
<b>Wetland 3</b>	Alternative 1: None  Alternative 2: None  <b>Alternative 3: None</b>	Wetland 3 is a permanently inundated reed wetland that holds low ecological importance. The location of this wetland further away from Govan Mbeki Road means that no infilling thereof would be required as it falls well beyond the proposed footprint (Belcher <i>et al</i> , 2021).
<b>Wetland 4</b>	Alternative 1: 2438  Alternative 2: 856  <b>Alternative 3: 750</b>	<p>Wetland 4 is a permanently – seasonally inundated mixed wetland comprising of ESNR (Belcher <i>et al</i>, 2021).</p> <p>Note that the wetland has been mapped to extend beyond the fence line of the reserve and that particular section is within the road reserve, highly degraded and artificial in nature (Belcher <i>et al</i>, 2021). This is the area that would be encroached upon as part of the proposed development and <b>not</b> at all the ESNR currently within the fence boundaries. ESNR is protected in perpetuity in terms of the National Environmental Management: Biodiversity Act (No. 10 of 2004).</p>



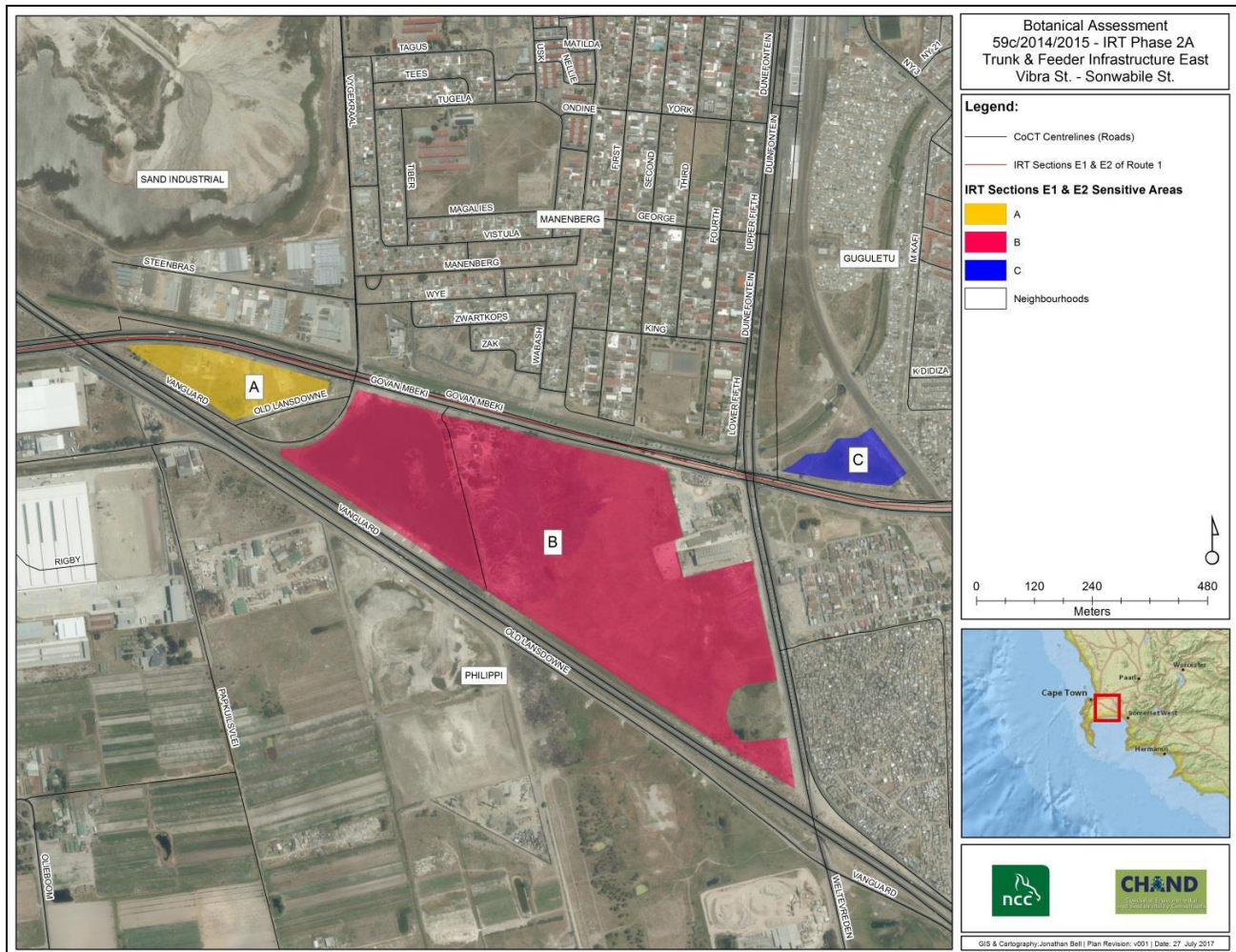
<b>Wetland 5</b>	Alternative 1: None	Wetland 5 is a permanently-seasonally inundated <i>Typha</i> bulrush dominated depression wetland of low ecological importance (Belcher <i>et al.</i> , 2021). Furthermore, it is located outside of the road reserve for Govan Mbeki Road and is thus unlikely to be impacted by the proposed works (Belcher <i>et al.</i> , 2021).
	Alternative 2: None	
	<b>Alternative 3: None</b>	

## 1.3 AFFECTED ENVIRONMENT

### 1.3.1 FLORA

The proposed route abuts three sensitive botanical areas, noting that in some cases the preferred alternative avoids these areas entirely and, importantly, the preferred alternative (i.e., Alternative 3) does not encroach into any of these areas beyond the road reserve. These areas are:

- **Section A:** An area of Cape Flats Sand Fynbos from the intersection with Vanguard/Jakes Gerwel Drive running approximately 450 m to the east (refer to Figure 12).
- **Section B:** An area of Cape Lowlands Freshwater Wetlands which is part of the ESNR (refer to Figure 12).
- **Section C:** An area of Cape Flats Dune Strandveld mapped as "Other Natural Area" from the intersection with Duinefontein Road running approximately 350 m to the east (refer to Figure 12).



**Figure 12: Botanically sensitive areas along the proposed route (source: NCC, 2018)**

**Section A** was formerly classified as a CBA2, however, given the state of the area, this classification has been removed and there is no longer a classification attached to it at all (Altern, 2021). No notable species were found during the site visit and a dense covering of invasive alien plants were identified (Altern, 2021). The entire section (i.e., not just the area which falls under the site) has little biodiversity value and is of low sensitivity (Altern, 2021). It is considered to be completely degraded, with the only possible function being (again, of the whole section) a slight buffer zone to ESNR (Altern, 2021). One indigenous species was identified during the botanist's site visit, namely *Zantedechia aethiopica* (Altern, 2021). The entire portion of the section which would be developed on as part of the proposed development (for all alternatives) has been heavily disturbed and is degraded being in an advanced state of transition from native to non-native cover resulting in the almost non-existence of indigenous species, associated vegetation type and eco-system function (Altern, 2021).

The preferred alternative (i.e., Alternative 3) shows minimal encroachment (approximately 200m<sup>2</sup>) into this area beyond the road reserve in this section (Altern, 2021).

**Section B** comprises of the ESNR, and three different vegetation types have been identified in the greater section, namely Cape Flats Sand Fynbos, Cape Flats Dune Strandveld, and Cape Lowlands Freshwater Wetlands (Altern, 2021). Much of the Cape Flats Sand Fynbos within the

proposed route is listed as Other Ecological Support Area (OESA), which serves as a buffer zone listed as open space irreversibly modified by agriculture or other activities which is essential for protected sites (Altern, 2021).

The Cape Flats Dune Strandveld located in the eastern section of the ESNR is listed as Protected: In Perpetuity (Altern, 2021). In regard to the route section pertaining to ESNR (i.e., the transitioned Cape Lowlands Freshwater Wetlands) the road verge between the shoulder of the M9 up to the boundary fence is considered "Replaced-Adventive" and comprises a mowed graminoid land (lawn-like in appearance) (Altern, 2021). Some sporadic indigenous species were found during the site assessment, however invasive alien plants encompass large tracts of the road verge section (i.e., the footprint within which the proposed development would be constructed) (Altern, 2021). Following a site investigation by an independent botanist, the road verge is rated as least-sensitive and is degraded and transformed, however the botanical assessment has indicated that the road verge does play "a very slight buffering role for the Edith Stephens Nature Reserve thereby protecting the more sensitive areas further within and contributing to the hydrological state of the area through absorption and directing of water run-off" (NCC, 2018) and therefore holds some local significance (Altern, 2021). The entire portion of the section which would be developed on as part of the proposed development (for Alternative 2 and 3) occurs on vegetation that is in a degraded and transformed state with the native vegetation community structure, composition, and regenerative capacity lost (Altern, 2021). This is a result of pedestrian traffic, mowing practices and excessive exotic grass growth, exaggerated as a result of edge effect and associated run-off from the road (Altern, 2021). The preferred alternative would be associated with a loss of about 400 m<sup>2</sup> of the Cape Lowlands Freshwater Wetlands, noting that this would fall within transformed vegetation within the road reserve and not in the ESNR (Altern, 2021).

The area within the fenced boundaries of the ESNR is of a high sensitivity and must be conserved, however the preferred alternative (as well as Alternative 2) does not encroach into this area (Altern, 2021). Alternative 1 would encroach into the highly sensitive area, which is part of the rationale behind why it is not considered the preferred alternative (Altern, 2021).

**Section C** comprises replaced Cape Flats Dune Strandveld and is listed as Other Natural Vegetation (ONV) which is of local significance and is described as a buffer zone of Natural vegetation in Endangered, Vulnerable and Least Concern in good, fair, or restorable condition (Altern, 2021). Following the site assessment, it has been found that alien invasive species dominate the site and that it has a very low conservation value. The entire portion of the section which would be developed on as part of the proposed development (for all alternatives) occurs on vegetation that is in a degraded and transformed state with the native vegetation community structure, composition and regenerative capacity lost and amounts to an extent of approximately 100 m<sup>2</sup> for the preferred alternative (Altern, 2021).

With regard to the proposed route envelope, the areas of vegetation identified are all transformed or degraded and are of low sensitivity (Altern, 2021).

Some trees were also identified along the route, however none have been found to be of significant age (25+ years) or are protected, as they are listed as least concern (LC) on the Red List of South African Plants (Altern, 2021). The trees are not considered to be of botanical importance, but rather trees which have been planted along the road for scenic value.

Overall, the portions of the abovementioned vegetation types within the proposed boundaries of the route have been found to be entirely transformed or degraded with little ecological value (Altern, 2021).



### 1.3.2 SURFACE WATER

There are five wetlands and one watercourse on site (refer to Figure 13). The watercourse is the Lotus River, and the wetlands are a mixture of seasonally to permanently inundated areas with the ESNR being the only ecologically important wetland in the area (Belcher *et al*, 2021).



**Figure 13: Location of Wetlands and the Lotus River Canal along the assessed route (source: Belcher *et al*, 2021)**

#### The Lotus River Canal

The river in question is the Lotus River which is described by the freshwater ecologist as comprises largely of an artificial canal system having naturally occurred as a series of wetland areas rather than a channelled aquatic ecosystem (Belcher *et al*, 2021). The geomorphological and physical characteristics of the Lotus River as it is on site are indicated in Figure 14.

Geomorphological Zone	Lowland
Lateral mobility	Completely confined
Channel form	Simple, canalized
Channel pattern	Single thread: no sinuosity
Channel type	Canal- concrete and earthen
Channel modification	Large scale modification (95% of river is canalized and the earthen section is heavily invaded by alien flora)
Hydrological type	Perennial
Ecoregion	South Western Coastal Belt
DWA catchment	G22D
Vegetation type	Cape Flats Sandstone Fynbos and Cape Flats Dune Strandveld
Rainfall region	Winter

**Figure 14 Geomorphological and Physical Features of the Lotus River (source: BlueScience)**

The Lotus River is considered to be in an extensively to critically modified ecological state and the ecological importance and sensitivity is considered to be low (Belcher *et al*, 2021). An important aspect of the river is the wetland areas associated with it, most notably the Zeekoevlei

(Belcher *et al*, 2021). Most of the fish species in the Zeekoewlei are alien with the only indigenous fish being the Cape Galaxias (Belcher *et al*, 2021). A number of frog species are found in the area (e.g., Clicking Stream Frog, Common Platanna, Arum Lily Frog and, most notably, the endangered Western Leopard Toad (Belcher *et al*, 2021).

## Wetlands

Five wetlands have been identified along the route as depicted in Figure 13.

The classification of wetland areas alongside the proposed route is depicted in Figure 15.

Name	Permanent wetlands	Edith Stephens wetland areas	Seasonal wetlands
System	Inland		
Ecoregion	South Western Coastal Belt		
Landscape setting	Plain		
Hydrogeomorphic Type	Depression		
Longitudinal zonation	Not Applicable		
Drainage	Storm water and High water table – groundwater.	Rainfall and High water table – groundwater. Some stormwater	Rainfall, stormwater and potential irrigation water
Seasonality	Permanent – Seasonal	Permanent, Seasonal and Temporary	Seasonal to Temporary
Anthropogenic influence	Adjacent to the road, largely maintained by stormwater.	Protected reserve. Stormwater attenuation ponds on south eastern edge.	Open area depressions adjacent to the road and urban areas
Vegetation	Cape Lowland Freshwater Wetlands	Cape Lowland Freshwater Wetlands, Cape Flats Dune Strandveld and Cape Flats Sand Fynbos	Cape Flats Dune Strandveld and Cape Flats Sand Fynbos
Substrate	Sand		
Salinity	Fresh	Mixed, areas of fresh and saline wetlands	Fresh

**Figure 15: Classification of Wetlands along the proposed route (source: Belcher *et al*, 2021)**

The wetlands within the study area, with the exception of the ESNR wetland areas are thus considered to be seriously and close to critically modified (Belcher *et al*, 2021). The ESNR wetlands (i.e., wetland 4) are considered to be moderately modified, as alien flora and urban encroachment has been relatively reduced through the protection of the area (Belcher *et al*, 2021).

All wetlands, with the exception of the ESNR wetlands, maintain low levels of biodiversity, with the sedge dominated wetlands providing less than that of the reed dominated wetlands (Belcher *et al*, 2021). The reed dominated wetlands offer ecosystem services in terms of stormwater management and trapping of sediment, nutrients, and toxicants. The sedge dominated wetlands also provide such services, but on a minor scale (Belcher *et al*, 2021).

The ESNR wetland, however, is unique in the services it provides in that it has value from a biodiversity conservation (i.e., it houses the *Cacosternum platys* and Western Leopard Toad) and education/research perspective. It also supplies stormwater management and sediment, nutrient, and toxicant trapping services (Belcher *et al*, 2021).

The seasonally to temporarily inundated sedge depression wetlands (wetlands 1 and 2) as well as the permanently and seasonally inundated wetlands (wetlands 3 and 5) are considered to have moderate to low ecological importance and sensitivity (Belcher *et al*, 2021). The ESNR (wetland 4) is considered to have high ecological importance and sensitivity (Belcher *et al*, 2021).

Specifically with regard to the proposed expansion, those portions of wetlands 1, 2, 3, 4 and 5 that occur within the road reserve and the proposed boundaries of the expansion activities are of very low significance, are often subject to disturbance and do not provide any valued goods and service with the exception of the mitigation of stormwater impacts (Belcher *et al*, 2021). If disturbed, these wetland areas and functionality will easily re-establish (Belcher *et al*, 2021). It has also been confirmed that the larger areas beyond the road reserve and site boundaries are unlikely to be impacted by the proposed activities. Note that the preferred alternative (i.e., Alternative 3) does not encroach onto Wetlands 2, 3, and 5 at all.

The anticipated encroachment within each area is summarised in Table 2. The most sensitive wetland along the route is the ESNR and, although the proposed route would encroach approximately 750 m<sup>2</sup> into this wetland, it would only be on areas beyond the fence line/ cadastral boundary and within the road reserve (i.e., not within the ESNR or the defined protected area indicated in Appendix G(b)), which are more transformed (Belcher *et al*, 2021).

The ESNR must be treated as a strict no-go area during construction and this requirement has been included as an environmental management specification in this EMPr.

### **1.3.3 HERITAGE/CULTURAL/ARCHAEOLOGICAL ASPECTS**

The proposed development would trigger Section 38(1)(3)(a) of the NHRA given that the proposed development would be longer than 300 m in extent.

#### **Historic movement routes**

Archaeological evidence in the Cape Flats area of the study area is currently considered negligible although some surface scatters occur particularly along the coastal areas of False Bay. Pre-colonial use by transhumant pastoralists occurred on the Cape Flats for hunting collecting and in search of grazing although this was likely to be sparse. Some early settlers used the area of the Cape Flats for grazing and for hunting, although the size of the leased areas suggests that large tracts of land were necessary to sustain livestock. It is possible that early colonial movement and transportation routes followed the same movement patterns, which followed the hard ground skirting the area between the base of the mountain and the sandy wastes of the Cape Flats (O'Donoghue, 2019).

Throughout the early settlement of the Cape it is noted that the development of a series of paths, grazing paths and short cuts throughout the Cape Flats which however would have been easier to traverse on horseback. Early settlement in the South-west Peninsula followed the development of routes from Cape Town extending along the lower reaches of back of Table Mountain in the vicinity of Newlands and Wynberg. Sandy soils on the Cape Flats precluded route development and such areas were only developed by the mid to late nineteenth century when improved technology allowed for the development of suitable roads. Settlement followed road development eastwards from the Main Road (O'Donoghue, 2019).

#### **Early settlement on the Cape Flats 1830- 1880: the Philippi area**

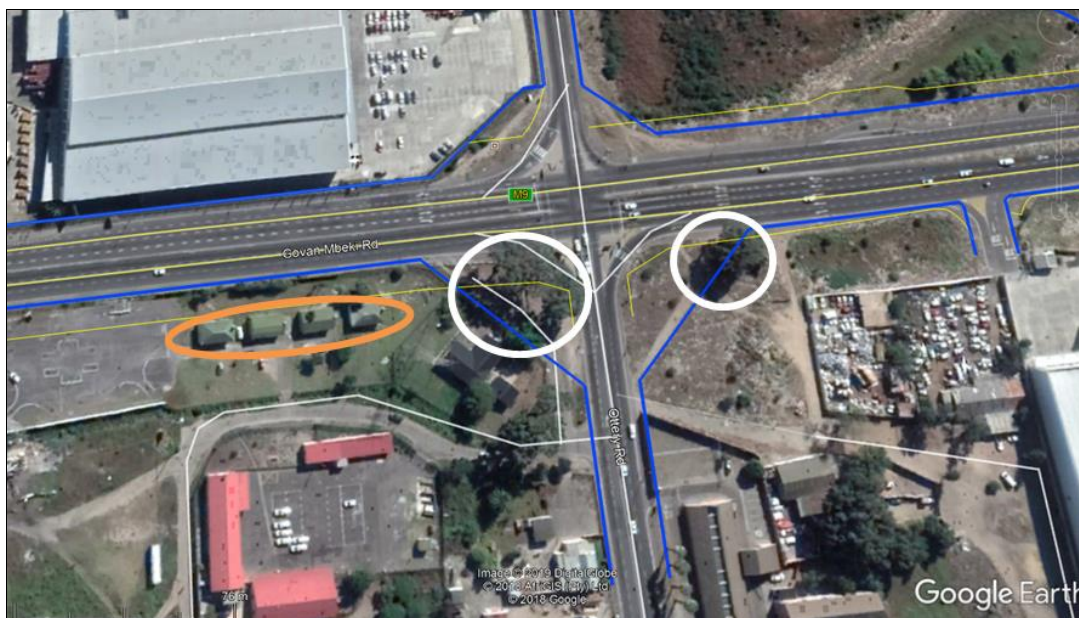
The first settlement to the east was the Klipfontein Mission established in 1833 by the Wesleyan Mission operating in South Africa. The mission acted as a place of safety for the dispossessed the poverty stricken and homeless emancipated slaves. The Wesleyan Mission Society acquired the land in 1865 administering it on behalf of the inhabitants of the mission itself. This settlement and the settlement at Wynberg were not connected by road and remained apart until the use of further land by the German agricultural settlers of the 1870's and 1880's. Routes extending west from the Peninsula development occurred in the mid nineteenth century in particular after 1877

when German agricultural settlers were established on the Cape Flats. Core to the settlement was the establishment of a Lutheran Church. The first school was built in 1884 followed by the first Lutheran Church in 1886. The Philippi smallholdings remained intact as agricultural areas until subdivision of the area between Hazendal and the Klipfontein Road and settlement in the north of Phillip, began a process of encroachment (O'Donoghue, 2019).

There are four key sites adjacent to the proposed road expansion which may have heritage significance, but upon closer examination would either not be affected or do not hold cultural significance (O'Donoghue, 2019). The sites identified are indicated in Figure 16, Figure 17, Figure 18, and Figure 19.

No	Site	Location	Assessment of significance
1	Edith Stevens Nature Reserve & associated structures	CA 609/13	Grade IIIB (natural heritage, social, contextual)
2	Mature Eucalyptus trees	Corner of Govan Mbeki and Ottery Road	Contextual
3	Four single storey detached buildings	Farm CA 616	No cultural significance
4	Two storey building (CCT offices).	Erf 8610/RE	No cultural significance

**Figure 16 Potentially significant heritage sites (source: O'Donoghue, 2019)**



**Figure 17 Section of road works from Vibra Road to Vanguard Drive (on the Govan Mbeki / Ottery Road corner). Four 60-year-old building within orange circle and Eucalyptus trees with white circles (source: O'Donoghue, 2019)**





**Figure 18: ESNR (created using Google Earth Pro and site layers from GIBB, 17/02/2021, on 18 June 2021)**

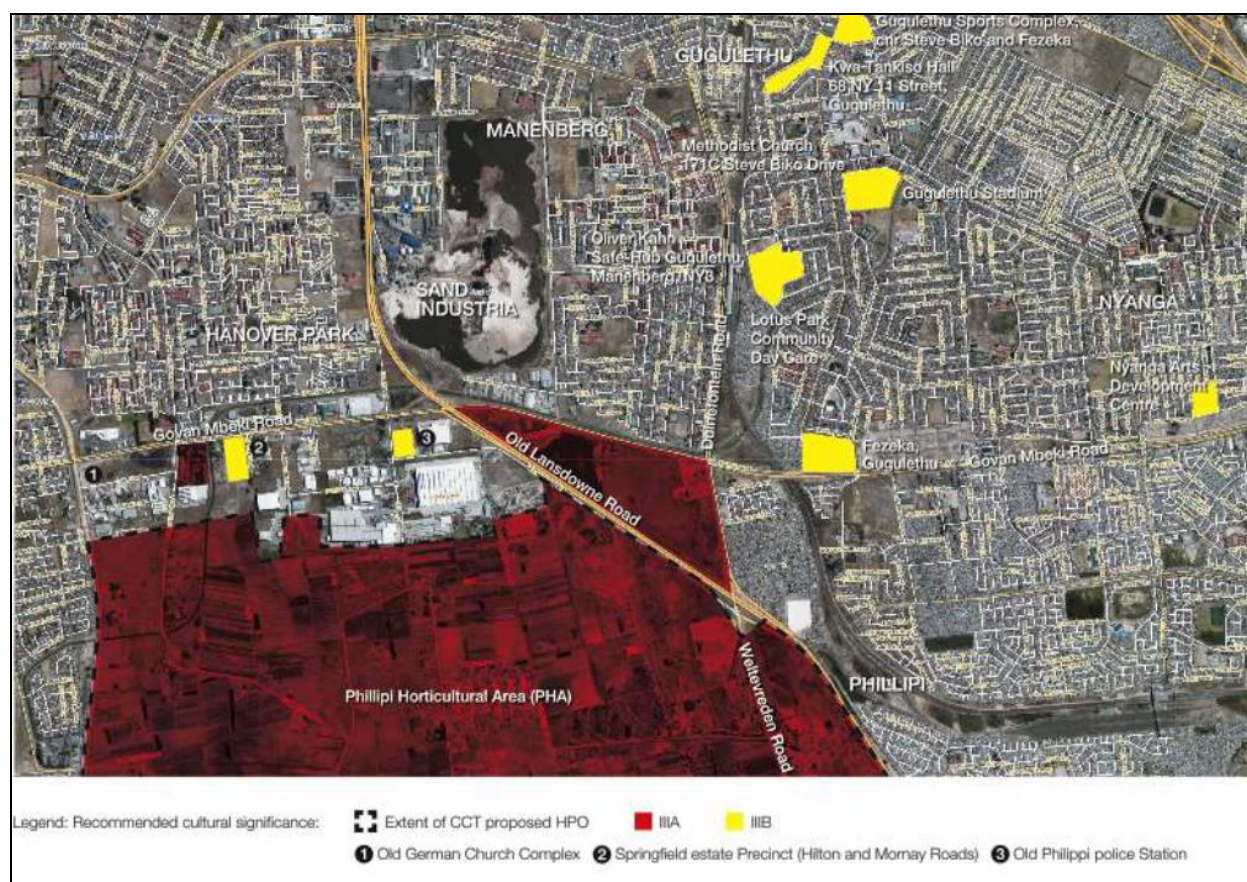


**Figure 19: Proposed Road works adjacent to the CCT buildings pre 1953 on Erf 8610/RE (created using Google Earth Pro and site layers from GIBB, 17/02/2021, on 18 June 2021)**



Note that the four buildings identified in item number 3 in Figure 16 constitute the traffic school and the building identified in item 4 (Figure 16) is the Fezeka building. Neither of the buildings/structures identified or the ESNR fall within the scope of the proposed road expansion and would not be affected. There is a possibility that the *Eucalyptus* trees would be removed, however this would be suitably mitigated through the implementation of planting new suitable trees in appropriate road reserve positions suggested by a Landscape Architect, as per the requirement of O'Donoghue (2019).

Beyond the immediate context of the site, the updated report also identified a list of sites in Gugulethu and Nyanga which hold cultural significance to the local communities. Refer to Figure 20. It is important to note that none of the sites identified in Figure 20 would be encroached upon by the proposed road expansion.



**Figure 20 Significant cultural and heritage sites, as indicated my members of the local communities (source: O'Donoghue, 2018)**

Finally, an additional site of importance was highlighted by one of the local sub-council managers as being important to the community. The property is across the railway line at the Lotus Canal (refer to Figure 21) and initiation ceremonies take place thereon. It was further indicated that the community would like to enclose the area by planting some trees and that the site be used as an initiation school. With respect to the proposed road widening, the proposal would not encroach upon the cadastral boundary of the site. The development and landscaping on that particular erf is not part of this proposal, however it is suggested that the local community engage their relevant Ward Councillor on their needs for the site.





**Figure 21: Initiation Site (indicated by purple triangle) (note that the community would like to use this to develop an initiation school)**

#### **1.4 SUMMARY OF IMPACTS (SUMMARY AS IDENTIFIED DURING THE BASIC ASSESSMENT PROCESS)**

PLANNING, DESIGN AND CONSTRUCTION PHASE IMPACTS:								
ALTERNATIVES	Road Geometry Alternative 1 & Canal Works		Road Geometry Alternative 2 & Canal Works		Road Geometry Alternative 3 (preferred) & Canal Works		No-go Alternative	
Impact:	Significance before mitigation:	Significance after mitigation:	Significance before mitigation:	Significance after mitigation:	Significance before mitigation:	Significance after mitigation:	Significance before mitigation:	Significance after mitigation:
ALTERING THE SURFACE DRAINAGE REGIME: Additional hard surfaces in some portions of the route would provide a marginal increase in hard areas for stormwater run-off	Medium (-)	Neutral	Medium (-)	Neutral	Medium (-)	Neutral	None	Not Applicable
BOTANICAL ASPECTS: Loss of Cape Flats Sand Fynbos (Former CBA2 Zone) Degraded and Transformed	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	No impact	Not Applicable
BOTANICAL ASPECTS: Loss of Cape Lowlands Freshwater Wetlands (ESNR) Degraded and Transformed	High (-)	High (-)	Low (-)	Low (-)	Low (-)	Low (-)	No impact	Not Applicable
BOTANICAL ASPECTS: Loss of Cape Flats Dune Strandveld (Other Natural Vegetation) Degraded and Transformed	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	No impact	Not Applicable
FRESHWATER ASPECTS: Limited disturbance to/loss of freshwater related habitats at the road- Wetlands	Medium to Low (-)	Medium to Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)
FRESHWATER ASPECTS: Impairment of downstream water quality impacts as a result of runoff from road and the construction activities	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)
FRESHWATER ASPECTS: Modification of flow during construction activities	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)
FRESHWATER ASPECTS: Limited loss/disturbance of freshwater related habitats at the road- Lotus River Canal	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)
SOCIO-ECONOMIC ASPECTS: Creation of employment opportunities as a result of development and construction on the route. Additional indirect economic impacts (stimulus) will also be experienced.	Medium (+)	Not Applicable	Medium (+)	Not Applicable	Medium (+)	Not Applicable	No impact	Not Applicable
VISUAL ASPECTS: Visual impacts associated with construction activities (machinery, vehicle movement, site camp, signage, lighting and temporary services, wind-blown litter, erosion, and exposed surfaces)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	No impact	Not Applicable
CULTURAL-HISTORICAL ASPECTS: Damage to cultural or heritage artefacts or landscapes as a result of construction activities.	No impact							
NUISANCE IMPACTS ON SURROUNDING LAND USERS – DUST AND NOISE: The land clearing and other construction activities will result in the generation of dust and noise which may be a nuisance to surrounding land users whilst construction is ongoing.	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	No impact	Not Applicable
USE OF NATURAL RESOURCES: Construction of the development and the associated use of natural resources, such as water, resources for the generation of energy, construction materials etc.	Medium (-)	Low (-)	Medium (-)	Low (-)	Medium (-)	Low (-)	No impact	Not Applicable
TRAFFIC: Disturbance to local traffic conditions (both vehicular and pedestrian) as a result of construction vehicles accessing the sites during the construction activities.	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	No impact	Not Applicable

OPERATIONAL PHASE IMPACTS:								
ALTERNATIVES	Road Geometry Alternative 1 & Canal Works		Road Geometry Alternative 2 & Canal Works		Road Geometry Alternative 3 & Canal Works (preferred)		No-go Alternative	
Impact:	Significance before mitigation:	Significance after mitigation:	Significance before mitigation:	Significance after mitigation:	Significance before mitigation:	Significance after mitigation:	Significance before mitigation:	Significance after mitigation:
BOTANICAL ASPECTS: Impact on associated floral species assessed as a result of wetter conditions related to increased stormwater run-off	High (-)	Low (-) *Note mitigation is implementation of another alternative	Medium (-)	Low (-)	Medium (-)	Low (-)	No impact	Not Applicable
BOTANICAL ASPECTS: Loss of Cape Lowlands Freshwater Wetlands (ESNR) as a result of the replacement of road reserve vegetation buffer and subsequent edge effect on the wetland park border edge.	High (-)	High (-)	Medium (-)	Medium (-)	Medium (-)	Medium (-)	No impact	Not Applicable
FRESHWATER ASPECTS: Modification of flow during operational activities	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)	Very Low (-)
FRESHWATER ASPECTS: Limited disturbance of freshwater related habitats at the road	Low (-)	Very Low (-)	Low (-)	Very Low (-)	Low (-)	Very Low (-)	Very Low (-)	Very Low (-)
VISUAL ASPECTS: Overall improvement to the appearance of the relevant portion of Govan Mbeki	Medium (+)	Not Applicable	Medium (+)	Not Applicable	Medium (+)	Not Applicable	No impact	Not Applicable
REDUCTION IN EMISSION OF GREENHOUSE GASES: Operation of the proposed route (i.e., the use of the route for public transport) would result in an increasing number of people making use of public transport over private transport. This would reduce the per capita emission of greenhouse gases in the surrounding community and beyond.	High (+)	Not Applicable	High (+)	Not Applicable	High (+)	Not Applicable	No impact	Not Applicable
SOCIO-ECONOMIC ASPECTS: Improved Accessibility: Provision of improved accessibility for previously disadvantaged communities with respect to employment, economic centres and places of education and recreation.	High (+)	Not Applicable	High (+)	Not Applicable	High (+)	Not Applicable	Medium (+)	Not Applicable
PUBLIC SAFETY (Non-Motorised Transport-NMT): Improvements to safety for all those accessing the area via NMT.	High (+)	Not Applicable	High (+)	Not Applicable	High (+)	Not Applicable	No impact	Not Applicable
TRAFFIC: Improvements to traffic conditions in the area	High (+)	Not Applicable	High (+)	Not Applicable	High (+)	Not Applicable	No impact	Not Applicable

## 1.5 STATUTORY APPROVALS

The required approvals in terms of applicable legislation are tabled below. It must be ensured that all required approvals are in place prior to the commencement of construction.

LEGISLATION	ADMINISTERING AUTHORITY	AUTHORISATION TYPE
National Environmental Management Act, 2008 (Act No. 59 of 2008) (NEMA)	DEA&DP: Land Use Management	Environmental Authorisation
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Heritage Western Cape (HWC)	Comment already obtained and confirmation received that no further assessments are necessary
National Water Act (No. 36 of 1998)	Department of Water and Sanitation	General Authorisation is required

For works proposed beyond the road reserve, it is possible that City of Cape Town Municipal Planning Amendment By-law, 2016 may apply and certain portions of erven may need to be sub-divided and rezoned. This will be investigated under a separate process.

Permits may also be required from the City of Cape Town Parks and Recreation branch for the removal of certain pavement trees.

Lastly, the City of Cape Town would undertake a separate land acquisition process for obtaining portions of land beyond the road reserve, where the detail design encroaches onto such areas.

## 1.6 COMPONENTS OF THE EMPr

The EMPr consists of the following components:

<b>Section 1:</b> Introduction	Provides background information regarding the site, the proposed development and the EMPr.
<b>Section 2:</b> Implementation of the EMPr	Provides details of the communication and organisational structures within which the EMPr will be implemented, responsibilities of key role players, and provides the terms of reference for the ECO.
<b>Section 3:</b> Environmental Management Specifications for Construction Phase	Provides all construction phase environmental management requirements applicable to the principal construction contractors, and their subcontractors.

<b>Section 4:</b> Environmental Management Specifications for Operational Phase	Provides all operational phase environmental management requirements applicable to the proposed road expansion.
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## 2. IMPLEMENTATION OF THE EMPR DURING THE CONSTRUCTION PHASE

### 2.1 INTRODUCTION

This document describes mitigation measures, identifying specific people or organisations to undertake specific tasks in order to ensure that impacts on the environment are minimised during the construction phase of this project. The EMPr is applicable to all works comprising the project. It is an open-ended document implying that information gained during construction activities and/or monitoring of procedures on site could lead to changes in the EMPr.

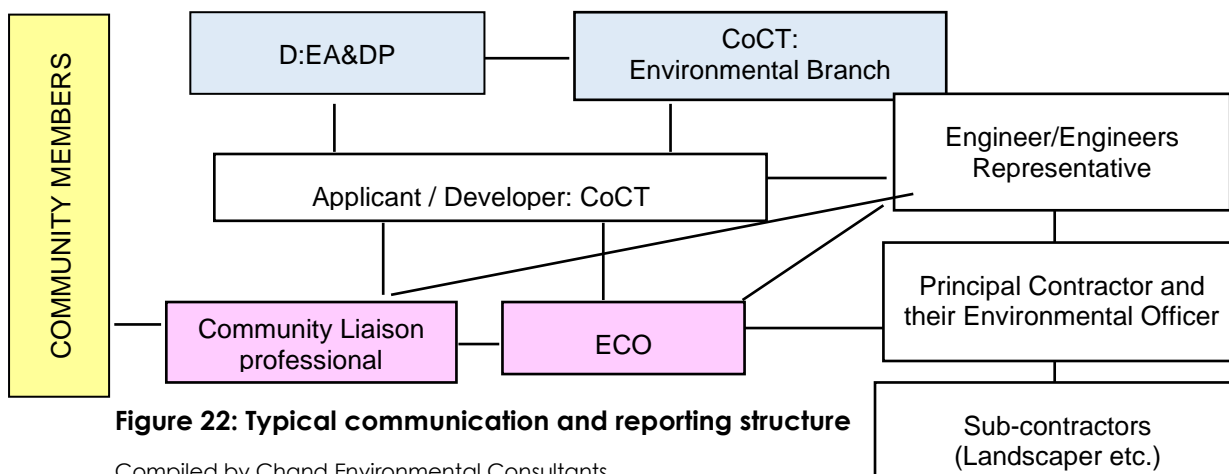
The appointed Environmental Control Officer (ECO) will monitor compliance with the EMPr and other Conditions of Approval contained in the Environmental Authorisation issued by the D:EA&DP, as they relate to environmental matters. This EMPr gives direction and guidance to all responsible parties. The responsible parties are expected to co-operate closely to minimise or avoid unnecessary environmental impacts.

Non-compliance penalties are described in this EMPr and are thus to be included into the official contract documentation. The contractor is obliged to inform the ECO immediately of events that may cause serious environmental damage or breach the requirements of the EMPr. The ECO in turn will immediately inform the Engineer and Developer and, if necessary, the environmental branch of the Local Authority, of such events.

### 2.2 ROLES AND RESPONSIBILITIES

The key role-players during the construction phase of the project, for the purposes of environmental management on site, include but are not limited to: the Applicant (developer), the engineer, the main contractors (direct appointments including civil works contractor, building contractor, landscape contractor etc.) the Environmental Control Officer, the Community Liaison Professional and representatives of the relevant Authority/ies.

Details of the responsibilities of each of the key role-players have been provided in sections 2.2.1 to 2.2.5. Lines of communication and reporting between the various parties are illustrated in Figure 22 below.



**Figure 22: Typical communication and reporting structure**



### **2.2.1 The Applicant / Developer**

With respect to the construction phase of the Development, the Applicant / Developer is to:

- Ensure that all relevant approvals and permits have been obtained prior to the start of construction activities on site;
- Ensure that D:EA&DP have been notified of the date on which construction activities will be starting, one week prior to commencement of the activity (or as per the requirement of the Environmental Authorisation);
- Ensure that construction activities start prior to the expiration date of the Environmental Authorisation issued by the D:EA&DP, failing which the approval of the development by the department would lapse unless an extension is applied for;
- Appoint a suitably qualified or experienced Environmental Control Officer prior to the start of construction activities on site, for the duration of the construction contract.
- Appoint a suitably qualified and experienced botanist to provide the guidance and oversight of rehabilitation activities where needed and as prescribed in this EMPr; and
- Appoint an experienced, independent public participation specialist to undertake the role of the Community Liaison Professional, as and when required. This appointment must be valid for duration of the construction contract.

### **2.2.2 The Engineer / Project Manager**

For the purposes of this document, "The Engineer" refers to the engineer / project manager for the development, or any other person authorised by the Developer, to be responsible for the technical and contractual implementation of the works to be undertaken.

The responsibilities of the Engineer are to:

- Ensure that the requirements as set out in this EMPr and by the relevant Authorities are adhered to and implemented;
- Assist the ECO in ensuring that the conditions of the EMPr are being adhered to and promptly issue instructions requested by the ECO, to the Contractor. All site instructions relating to environmental matters issued by the Engineer are to be copied to the ECO;
- Assist the ECO in making decisions and finding solutions to environmental problems that may arise during the various phases of the development;
- Ensure involvement of the Community Liaison Professional when required and issue instructions to the Contractor's accordingly;
- Review and approve construction Method Statements with input from the ECO;
- Order the removal of person(s) and/or equipment not complying with the specifications (as required by the ECO or otherwise);
- Issue penalties for transgressions of Environmental Specifications; and
- Provide input into the ECO's on-going internal review of the EMPr.

### **2.2.3 The Contractor**

For the purposes of this document "The Contractor" refers to any directly appointed company or individual (by the Developer) undertaking the implementation of the works. The Contractor will be responsible for the day-to-day implementation of the EMPr. During the course of construction regular compliance audits will need to be undertaken, which must be undertaken by appropriately qualified environmental practitioners.

The Contractor is to:

- Compile the required Method Statements for submission to the Engineer and the ECO for approval;
- Ensure implementation of all applicable Environmental Management Specifications, including all additional requirements related to approved method statements, during all works on site, failing which penalties, as outlined in the EMPr may be imposed by the ECO via the Engineer;
- Ensure that all of its sub-contractors, employees, suppliers or agents etc. are fully aware of the environmental requirements detailed in the Environmental Specifications of this EMPr (the main contractor will be held liable for any penalties incurred by sub-contractors);
- Liaise closely with the Engineer and the ECO and ensure that the works on site are conducted in an environmentally sensitive manner;
- Nominate a member of personnel as the contractors' Environmental Officer who will be responsible for enforcing the EMPr specifications on a daily basis. This individual shall liaise closely with the ECO and inform the Engineer, as well as the ECO, should environmental issues on site arise, e.g. dumping, pollution, littering and damage to vegetation;
- Carry out instructions issued by the Engineer, on request of the ECO, required to fulfil his/her compliance with the EMPr;
- Investigate and comply with all existing regulations and laws/by-laws unless the relevant authority grants specific written compliance with any legislation;
- Comply with the Occupational Health and Safety Act (Act 85 of 1993) and in particular the requirements of the current Construction Regulations; and
- Make provision for inspections of the site by any Authority and/or any party authorised by the Engineer or the ECO.
- Comply with the "Duty of Care" principle (section 28 of NEMA, 1998) to avoid and prevent any pollution incidents from occurring on site.

Upon failure by the contractor or contractor's employee to show adequate consideration to the environmental aspects of this contract, monetary penalties for breach of the EMPr (and thus the contract) may be imposed by the ECO via the Engineer or to have the Contractor's representative or any employee(s) removed from the site or work suspended until the matter is remedied. No extension of time will be considered in the case of such suspensions and all costs will be borne by the Contractor.

#### **2.2.4 Environmental Control Officer (ECO)**

A suitably qualified ECO shall be employed throughout the duration of the construction phase.

During the construction of the development, the ECO is to:

- Ensure that the Contractor has a copy of the EMPr and all agreed Method Statements;
- Ensure that the Stormwater Management and Landscaping Plans have been approved and are being duly implemented;
- Ensure that the development footprint remains within that proposed (i.e. Alternative 3) and that the proposed design for the Lotus Canal is implemented;
- Assist the Engineer in identifying the need for or applying for special or required permits;
- Undertake fortnightly site inspections (frequency may change as required), at all segments of the route with the exception of works adjacent to the ESNR cadastral

boundary where **site inspections are to occur on a weekly basis**, to audit compliance of all parties with the requirements of the EMPr;

- Ensure that the required oversight actions by a freshwater consultant are undertaken as stipulated in this EMPr;
- Advise/recommend on actions or issues impacting on the environment to the Engineer, who shall issue any required site instructions to the contractor;
- Environmentally educate and raise the awareness of the Contractor and his staff as to the sensitivity of the site and facilitate the appropriate attitude during works on site;
- Review and approve construction Method Statements together with the Engineer;
- Assist the Contractor in finding environmentally responsible solutions to problems;
- Recommend to the Engineer the issuing of a penalty for any environmental damage caused on site, or non-compliance with the Environmental Specifications;
- Recommend to the Engineer the removal of person(s) and/or equipment not complying with the Specifications;
- Engage the Community Liaison Professional on all matters relating to concerns / issues raised by the surrounding residents;
- Act as the contact person between the Developer, the City of Cape Town's Environmental Resources Management Unit, D:EA&DP and the public with regard to environmental matters;
- Report to the City of Cape Town's Environmental Unit and D:EA&DP, where required and in terms of the Conditions of Approval of the Environmental Authorisation, regarding the implementation of the EMPr, compliance with the Conditions of Approval contained in the Environmental Authorisation and implementation of the relevant mitigation measures contained in the EMPr;
- Keep a register of complaints and record and manage any community comments or issues, having reported these first to the Engineer;
- Undertake photographic monitoring of the construction site;
- Keep records of all activities/ incidents on site concerning the environment in a site diary;
- Complete temporary and permanent site closure checklists;
- Take immediate action on site to stop works where significant and irreparable damage is being inflicted on the environment, and inform the Engineer immediately of the occurrence and action taken; and
- Undertake a continual internal review of the EMPr and make recommendations to the Engineer and Developer. This includes monitoring of construction activities and compiling reports on performance relative to this EMPr.

The ECO has the authority to recommend to the D:EA&DP that works be stopped, if in his/her opinion serious harm to, or impact on, the environment is imminent, is likely to occur or has occurred. Furthermore, the ECO may also recommend that works be stopped if such actual or potential harm or impact is in contravention of this EMPr and which is, or may be, caused by construction, or related works.

Upon failure by the contractor or contractor's employees to show adequate consideration to the environmental aspects of this contract, the ECO may recommend to the Engineer and the project management team to have the contractor's representative, or any employee(s) removed from the site or work suspended until the matter is remedied. No extension of time will be considered in the case of such suspensions and all costs will be borne by the Contractor.

### 2.2.5 Community Liaison Professional

An experienced, independent public participation specialist must be appointed to act as the Community Liaison Professional for the duration of the construction contract to:

- Engage the surrounding residents on an *ad-hoc* basis throughout the construction phase on important matters arising that may have an impact on them;
- Liaise with those residing in the surrounding areas as and when valid complaints, issues or concerns are raised in relation to the construction works; and
- Propose additional mitigation for consideration by the Applicant and the Engineer if required / warranted. Instructions in this regard will be issued to the Contractor by Engineer.

## 2.3 MONITORING AND REPORTING

### 2.3.1 Site Instructions

Site Instructions, stipulating recommended actions required to improve compliance with the EMPr by the Contractor will be issued by the ECO to the Engineer, who in turn will ensure that the Contractor is informed of the said instruction.

The ECO will undertake fortnightly site inspections for the duration of the construction phase, **however weekly site inspections would be required during construction works adjacent to the cadastral boundaries of the ESNR.**

Comments made by the ECO in the Site Instruction Book are advisory and all site instructions required may only be issued by the Engineer. Site Instructions will also be used for the issuing of stop work orders for the purposes of immediately halting any particular activity(ies) of the Contractor deemed to pose immediate and serious risk of unnecessary damage to the environment.

### 2.3.2 Monthly Monitoring Reports

The ECO will compile a monitoring checklist to facilitate checking against the requirements of the EMPr. Monthly monitoring reports will be compiled in which events, concerns and general compliance of the Contractor with the EMPr will be recorded. This report will be submitted to the Engineer and if it is deemed necessary, to the authorities (i.e. D:EA&DP and City of Cape Town Municipality).

During the construction phase of the development, the ECO must report to the City of Cape Town's Environmental Resource Management Department and D:EA&DP, where required, regarding the implementation of the EMPr, compliance with the Conditions of Approval which would be contained in the Environmental Authorisation and implementation of the relevant mitigation measures contained in the EMPr.

Should the EMPr require further updates, the manner and frequency for updating the EMPr must be done as follows:

An application for amendment to the EMPr must be submitted to the competent authority if any further amendments are to be made to the EMPr, other than potential amendments mentioned in the environmental authorisation, water use authorisation and/or the town planning approvals. Further changes may only be implemented once the amended EMPr has been authorised by the competent authority.

### 2.3.3 Temporary Site Closure Report

If the site is closed for a period exceeding one week, a checklist procedure shall be carried out by the Contractor in consultation with the ECO.

The Contractor's Safety Officer(s) (in terms of the Occupational Health and Safety Act) are to check the site and report to the Engineer regarding the following:

Fuels / flammables / hazardous materials stores:

- Ensure fuel stores as low in volume as possible;
- No leaks;
- Outlet secure / locked;
- Bund empty;
- Fire extinguisher serviced and accessible;
- Secure area from accidental damage e.g. vehicle collision;
- Emergency and Management telephone numbers to be available and displayed; and
- Adequate ventilation.

Other:

- All trenches and manholes secured;
- Fencing and barriers in place per the Occupational Health and Safety Act (No. 85 of 1993);
- Notice boards applicable and secured;
- Security persons briefed and have facility for contact;
- Traffic management is applied in terms of safety for road users and pedestrians;
- Night hazards checked e.g. reflectors, lighting, traffic signage;
- Fire hazards identified – local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.;
- Pipe stockpile wedged / secured;
- Any scaffolds are secure; and
- Inspection schedule and log by security or contracts staff.

The ECO is to check and report to the Engineer:

- Wind and dust mitigation in place e.g. straw, brush packs, irrigation;
- Slopes and stockpiles at stable angle;
- Any landscaped areas' watering schedules & supply secured;
- Fuels/hazardous substances stores secure;
- Cement and materials stores secured;
- Toilets empty and secured;
- Refuse bins empty and secured (lids);
- Any oil or hydrocarbon spills are treated e.g. Spill Sorb or Enretech #1 powder;
- Drip trays empty & secure (where possible); and
- Structures vulnerable to high winds secure.

The Contractor is to ensure that all temporary closure requirements are met before leaving the site.

### **2.3.4 Construction Site Closure Report**

The ECO will compile a Final Closure Checklist for site closure auditing purposes. Once the site has been cleared of all construction related debris, materials and equipment the ECO will undertake an audit and report on the condition of the site and the adequacy of site clean-up / restoration/rehabilitation measures. The construction site will be regarded as being “closed” on agreement between the ECO and the Engineer that the Contractor has met all requirements to “make good”.

## **2.4 COMMUNICATION STRUCTURES ON SITE**

### **2.4.1 Site Meetings during Construction Phase**

The ECO is required to attend regular site meetings of the project management team during the construction phase to facilitate the transfer of information and to update all parties on the environmental compliance of the project as a whole and minute requirement.

The ECO will report on the main construction activities as they relate to the environment and any impacts and the mitigation thereof, at this meeting.

The minutes of these meetings will form part of the construction phase of the EMP records. These minutes will reflect environmental queries, agreed actions and dates of eventual compliance by the Contractor.

## **2.5 COMMUNITY RELATIONS**

All third party or public queries and/or complaints relating to the works will be handled by the Community Liaison Professional, who will in turn engage the Developer and the Engineer to agree on the way forward. In addition, the Community Liaison Professional and/or the Developer shall be responsible for dissemination of information to the community and the media (press releases, notice boards, etc.).

The Contractor shall keep a “Complaints Register” on site to record any complaints received and action taken. The Register shall contain all contact details of the person who made the complaint and information regarding the complaint itself. Copies of all entries into the complaints register should be kept in the environmental site file. The Contractor shall notify the Community Liaison Professional and ECO immediately of complaints lodged.

The Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for the Developer, the Community Liaison Professional and ECO for complaints by members of the public in accordance with details provided by the Engineer.

## **2.6 ENVIRONMENTAL EDUCATION PROGRAMME**

The Contractor in consultation with the ECO shall arrange for a presentation to site staff to familiarise them with the environmental aspects of the EMP within seven days from the commencement date of construction. This presentation should take cognisance of the level of education, designation and language preferences of the staff. General site staff would commonly receive a basic environmental awareness course highlighting general environmental “do’s and don’ts” and how they relate to the site. Management on site

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Final EMP for the proposed IRT Phase 2A Trunk E1 Expansion of Govan Mbeki Road

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e.g. site agents and foremen, who require more detailed knowledge about the environmental sensitivities on site and the contents and application of the construction phase of the EMPr document itself, will benefit from a separate presentation dealing with these issues. The ECO may call upon the services of a specialist environmental education translator should this be required.

Environmental awareness training courses shall be run for all personnel on site. All attendees shall remain for the duration of the course and sign an attendance register on completion that clearly indicates participants' names, a copy of which shall be filed in the (site) environmental file.

The Contractor's general site staff shall attend an initial presentation of approximately 45 minutes, and approximately half an hour a month thereafter for the duration of the contract shall be allowed for employees to attend any follow-up lectures, should this be deemed necessary by the ECO. In addition, all new staff and sub-contractor's employees that spend more than 1 day a week or four days in a month are to attend the environmental education program within 1 (one) week of commencement of work on site. The Contractor shall on request of the ECO provide documented proof (signed attendance registers) that all employees have received such training.

Notwithstanding the specific provisions of this clause, it is incumbent upon the Contractor to convey the sentiments of the EMPr to all personnel involved with the works.

The initial environmental awareness training course shall be presented by the ECO. Subsequent courses to be held as and when required should be presented by the Contractor's Environmental Officer or the Health and Safety Officer.

## **2.7 OCCUPATIONAL HEALTH & SAFETY REQUIREMENTS**

The Occupational Health and Safety Act (Act 85 of 1993) and in particular the requirements of the Construction Regulations issued in July 2003, must be complied with but fall beyond the scope of this EMPr.

## **2.8 DISPUTE RESOLUTION**

Any disputes or disagreements between role players on site (with regard to environmental management) will firstly be referred to the Engineer. If no resolution on the matter is possible then the matter will be referred to the CCT Environmental Resource Management for clarification.

Where a dispute still persists this shall be referred for arbitration to a panel of persons, consisting of one specialist environmental consultant, one qualified engineer, one official of the D:EA&DP and one legal practitioner of no less than 4 years' experience in environmental issues whose decision by simple majority will be final and binding on the parties. Representatives of the Developer, the Engineer, Contractor and ECO should appoint the panel by mutual agreement. This arbitration will be informal ("the informal arbitration") and will be finalised within a period of 48 hours from the date of the ruling of the ECO, the purpose being to ensure that disagreements are rapidly resolved and thereby to limit any prejudice to the Contractor or the other parties to this agreement in the construction process. In the event of a deadlock in the aforesaid panel, the legal practitioner forming part of the panel will have a casting vote.

## **2.9 SOCIAL RESPONSIBILITIES**

The Developer and Contractor(s) shall encourage and implement wherever possible the procurement of locally based labour, skills and materials.



### **3. DESIGN AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)**

#### **3.1 INTRODUCTION**

The Environmental Specifications contained in this section of the EMPr cover the requirements for controlling the impact of design as well as construction activities on the environment.

This section of the document describes mitigation measures in detail, and is partly prescriptive, identifying specific people or organisations to undertake specific tasks in order to ensure that impacts on the environment are minimised during the construction phase of this project. This section of the EMPr is applicable to all works associated with the widening and upgrades of the E01 road section as described in this EMPr. It is an open-ended document implying that information gained during construction activities and/or monitoring of procedures on site could lead to changes in the EMPr.

The appointed Environmental Control Officer (ECO) will monitor compliance with section 3 of the EMPr and other Conditions of Approval contained in the Environmental Authorisation issued by the DEA&DP, as they relate to environmental matters. This EMPr gives direction and guidance to all responsible parties. The responsible parties are expected to co-operate closely to minimise or avoid unnecessary environmental impacts.

Non-compliance penalties are described in this EMPr and are thus to be included into the official contract documentation with contractors. The Contractor is obliged to inform the ECO immediately of events that may cause serious environmental damage or breach the requirements of the EMPr. The ECO in turn will immediately inform the Engineer and Applicant and, if necessary the environmental branch of the Local Authority, of such events.

#### **3.2 METHOD STATEMENTS**

The Contractor shall provide Method Statements for approval by the ECO and the Engineer prior to work commencing on aspects of the project identified to be of greater risk to the environment and/or which may not be covered in sufficient detail in the EMPr, when called upon to do so by the Engineer or ECO.

A Method Statement is a "live document" in that modifications are negotiated between the Contractor and the ECO/project management team, as circumstances unfold. All Method Statements will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMPr.

Note that a Method Statement is a 'starting point' for understanding the nature of the intended actions to be carried out and allows for all parties to review and understand the procedures to be followed in order to minimise risk of harm to the environment.

A Method Statement describes the scope of the intended work in a step-by-step description in order for the ECO and the Engineer to understand the Contractor's intentions. For each instance where it is requested that the Contractor submit a Method Statement to the satisfaction of the Engineer and ECO, the format should clearly indicate the following:

- **What** - a brief description of the work to be undertaken;
- **How** - a detailed description of the process of work, methods and materials;
- **Where** - a description/sketch map of the locality of work (if applicable);
- **When** - the sequencing of actions with due commencement dates and completion date estimates;
- **Who** – The person responsible for undertaking the works described in the Method Statement; and
- **Why** – a description of why the activity is required.

The Contractor shall provide Method Statements for approval by the ECO and the Engineer prior to work commencing on aspects of the project deemed to pose environmental risks. Changes to, and adaptations of Method Statements should be made in response to changes in construction methods or where effectiveness of environmental management measures requires improvement.

The Engineer / ECO may request a Method Statement for any activity he believes may impact on the environment. The Engineer / ECO may also require changes to a Method Statement if the proposal does not comply with the Specification or if, in the reasonable opinion of the Engineer, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the Specifications.

Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. The Contractor shall carry out the works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the Contract.

### **3.2.1 Specific Method Statements Required**

The following initial Method Statements shall be provided by the Contractor and submitted to the ECO at least seven working days before site establishment:

- **Site Establishment and Site Camp Division**

The location, layout and method of establishment of the construction camp (including all no-go areas, buildings, offices, lay down yards, vehicle wash areas, fuel storage areas, batching areas and other infrastructure required for the running of the project) shall be detailed and presented in a drawing. Cognisance must be taken of the environmental management requirements set out in this EMP in developing this plan.

- **Site Clearing**

Method and schedule for the felling of trees and clearing of vegetation on site during site, disposal procedure for cleared material, as well as topsoil management.

- **Access/Haul Routes & Traffic Management**

Details, including a drawing, showing where and how the access points and routes (including areas where plant would be parked) will be located and managed, including

traffic safety measures that will be utilised. Detail the traffic control measures to be implemented for each phase of construction in order to reduce the impact on traffic flow along Govan Mbeki Drive. This is also referred to as a Traffic Management Plan, and the City of Cape Town may request a copy as well.

- **Fuel Storage and Use**

The design, location and construction of the fuel storage and service areas as well as for the filling and dispensing from storage tanks and management of drip trays.

- **Solid Waste Management**

Expected solid waste types, sorting methods, quantities, methods and frequency of collection and disposal, as well as location of disposal sites. Include details of the proposed recycling program.

- **Contaminated Water**

Methods of minimising, controlling, collecting and disposing of contaminated water.

- **Stormwater management**

Methods of managing, controlling, stormwater runoff during construction.

- **Hazardous Substances**

Details of any hazardous substances / materials to be used, together with the transport, storage, handling and disposal procedures for the substances.

- **Cement and Concrete Batching**

Location, layout and preparation of cement / concrete mixing areas including the methods employed for the mixing of concrete, particularly the containment of runoff water from such areas and the method of transportation of concrete.

- **Dust**

Details on the methods employed for reducing dust on the site.

- **Emergency Procedures**

Emergency procedures for fire, accidental leaks and spillages of hazardous substances (including fuel and oil). Include details of risk reduction measures to be implemented including fire-fighting equipment, fire prevention procedures and spill kits (materials and compounds used to reduce the extent of spills and to breakdown or encapsulate hydrocarbons).

- **Noise mitigation methods**

Detail the steps to be implemented to reduce/avoid noise impacts on the surrounding area.

- **Additional Method Statements required**

Any additional Method Statements that may be required by the Engineer and ECO during the course of construction are to be provided by the Contractor within a minimum of 10 working days prior to the commencement of works or activities to which they apply.

Compiled by Chand Environmental Consultants

Final EMP for the proposed IRT Phase 2A Trunk E1 Expansion of Govan Mbeki Road

November 2021

The ECO may require changes to a Method Statement if the proposal does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the specifications or any legislation.

Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel and Sub-contractors. The Contractor shall carry out the works in accordance with the approved Method Statement. Approval of the method statement shall not absolve the Contractor from any obligations or responsibilities in terms of the contract. No claim for delay or additional cost incurred by the Contractor shall be entertained should the inadequacy of a method statement be the cause.

### **3.3 ENVIRONMENTAL MANAGEMENT REQUIREMENTS**

The environmental management requirements take account of the findings of the Basic Assessment together with the typical measures needed to prevent or at least minimise potential adverse environmental effects associated with construction activities. Method Statements must take account of these requirements. Additional measures may be identified during the course of construction and Method Statements would be required in this regard. Environmental management requirements cover the following:

- Detail design phase;
- Waste management;
- Soil and water pollution management;
- Protection of natural features, fauna and flora;
- Protection of any paleontological and archaeological resources;
- Noise management;
- Dust management;
- Aesthetics;
- Hazardous substances management;
- Site access, access routes, and traffic management;
- Labour relations, facilities and site health and safety;
- Incident management;
- Resource use (raw materials and resources); and
- Site clean-up and rehabilitation.

**Table 3** Table of Environmental Management Requirements / Specifications

ISSUE	MANAGEMENT / MITIGATION MEASURES
<p><b>DETAIL DESIGN MEASURES:</b></p> <p><u>Management Statement and objective:</u> To ensure that the final designs are in line with the considerations contemplated in the environmental assessment phase.</p> <p><u>Impact Management Outcomes:</u> No deviations from the below.</p>	
<p><b>Stormwater</b></p>	<ul style="list-style-type: none"> <li>• Preliminary stormwater design measures as described in the project scope (section 1.2 of this EMPr) must be reflected in the final Stormwater Management Plan and implemented.</li> <li>• The final Stormwater Management Plan must be approved by the City of Cape Town's Stormwater and Catchment Management branch.</li> <li>• When designing the Stormwater Management Plan, stormwater infrastructure from the roads can be channelled into the permanently and seasonally inundated wetlands (Wetlands 1, 2, 3 and 5) as this is their primary function (Belcher <i>et al</i>, 2021).</li> <li>• No stormwater is permitted to flow into the ESNR. Stormwater run-off from the road adjacent to the ESNR should be carefully managed in order to prevent surface as well as sub-surface flow from the road entering into the ESNR by directing it away from ESNR into the Lotus Canal.</li> <li>• Roadside kerbs and gutters are to channel surface run-off into the stormwater system as no storm water is to be discharged into natural vegetation (Altern, 2021).</li> <li>• The Site Manager of the ESNR and a representative from City of Cape Town Biodiversity should be engaged during the compilation of the final Stormwater Management Plan and associated detail design of sections of the route adjacent to ESNR (this is to include discussion on the construction and maintenance of a fence).</li> <li>• Ensure that the impermeable concrete barrier as described in section 1.2 and Figure 5 is included in the final plans. An alternative design may be employed which would comprise a solid concrete balustrade with a suitable water stop, but this would need to be resolved at detail design, noting that the typical cross section and function would apply either way (GIBB, 2021).</li> </ul>
<p><b>Botanical/ Landscaping requirements</b></p>	<ul style="list-style-type: none"> <li>• Approval must be obtained from the City of Cape Town for the final Landscaping Plan prior to implementation.</li> <li>• The final approved (by City of Cape Town) Landscaping Plan is to be provided to the DEA&amp;DP for their information prior to the commencement of construction.</li> <li>• The City Parks Department is to be consulted in terms of section 7.2.1.1. of the CoCT Tree Management Policy regarding the removal of trees along the proposed route, specifically with regard to the procedures to be followed. Permit applications must be made where necessary before any pavement trees are removed (Altern, 2021)</li> </ul>



	<ul style="list-style-type: none"> <li>When compiling the final Landscaping Plan, no locally indigenous flora may be used for landscaping unless from a guaranteed source within the study area i.e., originating from a natural population in the study area. This is to prevent genetic contamination of existing populations. If a species is moved outside of its natural range and into that of a closely related species, problems associated with competition and hybridisation (when two varieties or species interbreed to form a hybrid or "mix") could result (Esler, Pierce &amp; De Villiers, 2014, Pg. 151, in Altern, 2021).</li> <li>It is important to note that no exotic or commercially available seed mixes may be used for rehabilitation of disturbed areas. The City's Biodiversity Management Branch should be consulted as to suitable plants and their availability. Suitable species which must come from a reputable supplier and grown from a guaranteed source in close proximity (25km) to the disturbed site must be used. These include but are not limited to the readily available species indicated below: <ul style="list-style-type: none"> <li>Groundcover species: <ul style="list-style-type: none"> <li><i>Arctotis stoechadifolia</i></li> <li><i>Carpobrotus edulis</i></li> <li><i>Geranium incanum</i></li> <li><i>Helichrysum dasyanthum</i></li> <li><i>Ruschia macowanii</i></li> <li><i>Pelargonium botulinum</i></li> <li><i>Pelargonium capitatum</i></li> <li><i>Helichrysum patulum</i></li> <li><i>Arctotis stoechadifolia</i></li> </ul> </li> <li>Shrub species: <ul style="list-style-type: none"> <li><i>Athanasia dentate</i></li> <li><i>Chrysocoma coma-aurea</i></li> <li><i>Chrysanthemoides monilefera</i></li> <li><i>Cliffortia orbicordata</i></li> <li><i>Elegia tectorum (Wetland)</i></li> <li><i>Eriocephalus africanus</i></li> <li><i>Felicia filifolia</i></li> <li><i>Ficinia nodosa (Wetland)</i></li> <li><i>Juncus Kraussi (Wetland)</i></li> <li><i>Metalasia muricata</i></li> </ul> </li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>○ <i>Ficinia lateralis</i></li> <li>○ <i>Plecostachys serpyllifolia</i></li> <li>○ <i>Salvia Africana-lutea</i></li> <li>○ <i>Muraltia spinosa</i></li> </ul> <ul style="list-style-type: none"> <li>• New trees which are appropriate to the context are to be planted in place of the Eucalyptus trees depicted in Figure 16 (O'Donoghue, 2018).</li> <li>• Additional measures regarding landscaping provided by OVP (2018) include the following:  <b>Planting and Water Management:</b> <ul style="list-style-type: none"> <li>○ Stormwater from roadway catchpits and sub-surface drains, located below the kerb lines, is to be directed to tree and shrub planting areas.</li> <li>○ Water-wise planting strategies, permeable hardscaping and sustainable drainage systems address the draught conditions.</li> <li>○ The emphasis on seasonal, low-maintenance planting strategies, permeable surfaces and durable hardscapes contribute to the all-round sustainability of the project.</li> <li>○ The City's Management of Urban Stormwater Impacts Policy requires new developments above a certain size to use SUDS principles to manage storm-water run-off. Any water passing out of a development area must not flow faster or at greater volumes than before development. They also have to include measures to encourage infiltration and to reduce water pollution. These principles would be applied where possible.</li> </ul> </li> </ul>
<b>Site Plan and Detailed Design Requirements</b>	<ul style="list-style-type: none"> <li>• Alternative 1 is to be avoided, particularly in Section B (ESNR).</li> <li>• During the detailed design, it is important to remain mindful of the following guidelines suggested by the freshwater ecologist: <ul style="list-style-type: none"> <li>○ Minimise the spatial extent of disturbance and maximise physical diversity;</li> <li>○ Minimise the frequency of, or requirement for, maintenance activities;</li> <li>○ Minimise upstream/downstream impacts;</li> <li>○ Maintenance activities are best done during the dry season; and</li> <li>○ Valuable habitats should be retained.</li> </ul> </li> <li>• The final Site Plan is to be approved by the City of Cape Town prior to commencement of construction.</li> <li>• <u>This includes a full set of civil services plans to be submitted to the Road Infrastructure and Management branch and Water &amp; Sanitation (bulk services) department for evaluation and approval before construction drawings are finalised.</u></li> <li>• The final approved (by City of Cape Town) Site Plan is to be provided to the DEA&amp;DP for their information prior to the commencement of construction.</li> </ul>

	<ul style="list-style-type: none"> <li>• <u>Timeous consultation with the City of Cape Town's Biodiversity Management Branch must be conducted before final approval of all drawings/plans relating to stormwater management, landscaping, rehabilitation, street lighting, fencing and the retaining wall is conducted.</u></li> <li>• <u>Street lighting must be directed away from the Edith Stephens Nature Reserve (as per comment from CCT Biodiversity Management Branch).</u></li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>WASTE MANAGEMENT</b>  <u>Management Statement and objective:</u> To prevent pollution/contamination associated with the generation and temporary storage of general waste, hazardous waste construction rubble and litter generated by the workforce on site.  <u>Impact Management Outcomes:</u> No non-conformances and no pollution of soil, groundwater and/or stormwater as a result of waste generation and management activities.	
<b>General requirements</b>	<ul style="list-style-type: none"> <li>• <u>Contractor's and sub-contracting staff must comply with the "Duty of Care" principle (section 28 of NEMA, 1998) to avoid and prevent any pollution incidents from occurring on site.</u></li> <li>• Construction related waste will typically include general waste (such as plastic packaging, strapping, and lunch wrappers.), rubble (like broken bricks, tiles, waste concrete) and limited quantities of hazardous waste items (e.g. paint tins, oily rags etc.).</li> <li>• The Contractor shall be responsible for the establishment of an integrated waste management system that is acceptable to the Engineer and ECO, and a Method Statement is required in this regard. The Method Statement must include a description of the estimated quantity and types of waste, a description of the services required to store, collect, transport and dispose of waste and a procedure for separating recyclable and non-recyclable material. The local authority must be notified of any changes to the estimated quantities and types of waste.</li> <li>• No refuse, building rubble or waste material will be disposed of by burying.</li> <li>• Construction waste must be sorted into recyclable and non-recyclable waste.</li> <li>• <u>Crushed construction/building &amp; demolition waste should, depending on the quality, also be used as sub-base for paving (including road construction) (DEA&amp;DP, 2018).</u></li> <li>• <u>Reclaimed asphalt may be used to patch roads, for on-site processing into hot-mix for roads or road base or fill material (DEA&amp;DP, 2018).</u></li> <li>• The Contractor will be responsible for ensuring the removal of the waste to City-approved recycling facilities (where</li> </ul>

	<p>possible), as well as the final disposal of non-recyclable wastes at a registered landfill facility.</p> <ul style="list-style-type: none"> <li>On-site waste segregation shall take place. Waste shall be sorted into the following categories: <ul style="list-style-type: none"> <li>Paper / cardboard;</li> <li>Metals;</li> <li>Non-recyclable general waste;</li> <li>Glass; and</li> <li>Hazardous waste.</li> </ul> </li> <li>Contact the following numbers for information on recycling collection points: <ul style="list-style-type: none"> <li>Plastic containers: Plastics Federation (021) 591 5512;</li> <li>Cans and tins: Collect-a-Can (021) 534-7010;</li> <li>Glass: Consol Glass (021) 888 4000;</li> <li>Motor and cooking oils: Oilkol (086) 110 1961;</li> <li>Paper: Nampak 0800 018 818; and</li> <li>Organic waste: Reliance Compost (021) 872 5962.</li> </ul> </li> <li><u>Small local businesses offering waste management services should be supported, where feasible.</u></li> </ul>
<b>Storage, handling and disposal of general waste</b>	<ul style="list-style-type: none"> <li>Waste may be temporarily stored on site in a central waste storage area that is weatherproof and scavenger-proof, and which both the Engineer and the ECO have approved.</li> <li>All waste shall be sorted in the waste handling / storing area. The location of the waste storage area shall be approved by the ECO and shall be sited a suitable distance from the wetlands to prevent impacts.</li> <li>Colour-coded or clearly marked skips / bins will be utilised in order to differentiate the various waste types suitable to each receptacle.</li> <li>General waste must be removed from the site at least once every two weeks provided that it does not pose a risk to human health.</li> <li>Waste may only be disposed of at a licenced landfill site approved by the Engineer and the ECO or to legitimate recycling facilities.</li> <li>Waste disposal certificates must be obtained and filed in the environmental file and submitted with the monthly audit reports.</li> <li>As far as possible, materials used or generated by construction shall be recycled.</li> </ul>

	<p><b>Recycling ensures that we do not waste valuable resources</b></p> <p><b>Recycling can also create employment opportunities</b></p>
<b>Litter prevention and housekeeping</b>	<ul style="list-style-type: none"> <li>• Litter and general waste materials (excluding rubble and hazardous waste materials) shall be disposed of into scavenger-and weather-proof bins.</li> <li>• The Contractor shall provide sufficient bins with lids on site to store the waste produced on a daily basis. Bins shall not be allowed to become overfull and shall be emptied as required, but at least weekly, to prevent overtopping.</li> <li>• The Contractor shall provide dedicated resources to clean up the Contractor's camp and working areas <b>daily</b> and ensure that refuse is placed within the central waste storage area to prevent spreading as a result of wind.</li> <li>• Empty cement bags must be collected from the construction area by the end of every day and before rain events and shall be stored in bins that are either placed under cover or have been fitted with lids.</li> <li>• Wind-blown litter beyond the site boundary that are in the opinion of the ECO emanating from works on site must be cleared as part of the waste management of the site.</li> </ul>
<b>Storage, handling and disposal of hazardous waste</b>	<ul style="list-style-type: none"> <li>• Hazardous and general waste must be stored separately and in a location a minimum of 30 m from the cadastral boundaries of the ESNR. Hazardous waste containers must be stored in a secure area with bunding / secondary containment. The location of the storage area is to be approved by the Engineer and the ECO.</li> <li>• All hazardous waste must be placed in drums / containers labelled for this purpose. These containers must be kept securely closed when not in use and must be protected from the ingress of rain.</li> <li>• Hazardous waste may not be disposed to a General Landfill site and waste must be removed by a registered hazardous waste Contractor for disposal to a licensed hazardous waste landfill. This must be done at least once every three months in accordance with the limit applicable to the temporary storage of hazardous waste, provided that it does not pose a risk to human health.</li> <li>• Records of hazardous waste disposal must be maintained. The Contractor shall retain copies of receipts from such waste disposal sites to the Engineer and ECO as proof of proper disposal.</li> <li>• Storage and disposal of waste items are also controlled through other relevant legislation which must be complied with e.g. Occupational Health &amp; Safety Act.</li> </ul>
<b>Storage, handling and disposal of vegetative waste</b>	<ul style="list-style-type: none"> <li>• Cleared vegetative material is not to be disposed anywhere and <u>must be chipped and/or composted, either on-site or at a licensed facility.</u></li> <li>• Any invasive alien plant species, which are removed from the site, are not to be chipped for mulch if they are in a seed-bearing state. Such material is to be disposed of at a suitable waste disposal site.</li> </ul>



	<ul style="list-style-type: none"> <li>Plant material removed from the site is not to be burnt for disposal on site given the proximity to dwellings in the surrounding area.</li> </ul>
<b>Storage, handling and disposal of builders rubble</b>	<ul style="list-style-type: none"> <li>In accordance with the integrated waste management approach to be followed through the construction phases of the development, materials used or generated by construction, or the construction areas of other City of Cape Town projects nearby shall be re-used as far as possible. <b>Clean</b> builders' rubble and soil/sand/rock may therefore be used as infill material / backfill material at the ECO's discretion.</li> <li>All builders' rubble is to be removed from the works area on a weekly basis and taken to the temporary storage area at the site camp.</li> <li>The Contractor shall provide resources to clean up the Contractor's camp and working areas of rubble generated in the course of construction work at least twice a week, or more frequently if specifically required.</li> <li>Rubble shall be temporarily stockpiled in a waste skip or a central stockpile and shall be removed from site to an approved landfill site as soon as it constitutes a practical load for removal and before temporary closure of the site.</li> <li>No plastics, shrink wrap, paint buckets or any other debris that do not constitute clean building rubble, shall be stored at such stockpile sites.</li> </ul>

ISSUE	MANAGEMENT / MITIGATION MEASURES
<p><b>SOIL AND WATER POLLUTION MANAGEMENT</b></p> <p><u>Management Statement and objective:</u> To prevent impacts on the wetland system, to prevent groundwater and freshwater pollution / sedimentation associated with the handling storage and use of hazardous materials or materials that have the potential to cause environmental harm.</p> <p><u>Impact Management Outcomes:</u> No non-conformances, no evidence of sedimentation and no pollution groundwater and/or stormwater or any water courses as a result of the construction activities.</p>	
<p><b>Prevention of impacts on the wetland system</b></p>	<ul style="list-style-type: none"> <li>• The wetland areas that are outside of the road reserve/approved development footprint (as identified in Figure 13) should be demarcated as “no-go” areas prior to commencement of construction activities (Belcher <i>et al</i>, 2021). No vehicles, machinery, personnel, construction material, cement, fuel, oil, bitumen or waste should be allowed into these no-go areas, unless express permission is granted by the Environmental Control Officer (ECO) for specific activities.</li> <li>• Work should be limited as far as possible to within the road reserve and the disturbed areas rehabilitated immediately afterwards (Belcher <i>et al</i>, 2021). The road reserve should be clearly demarcated (e.g. with “droppers” and safety netting).</li> <li>• During the construction works adjacent to the ESNR cadastral boundary, wetland areas adjacent to the road reserve should be inspected at least weekly by the ECO for signs of disturbance, sedimentation and pollution during the construction phase. If signs of disturbance, sedimentation or pollution are noted, immediate action should be taken to remedy the situation and, if necessary, a Freshwater Ecologist should be consulted for advice on the most suitable remediation measures.</li> <li>• Particularly with respect to the cadastral boundary of ESNR, a silt screen of at least 1.5 m high is to be erected along the boundary prior to the commencement of works in the area and is to remain in place until the conclusion of works. Note that this should be arranged in conjunction with the Site Manager of the ESNR.</li> <li>• Clearing of invasive alien plants within the disturbed areas and road reserves should take place during and after construction. Any invasive alien plants occurring within the road reserve should be removed during construction according to methods as provided by the Working for Water Programme (Belcher <i>et al</i>, 2021).</li> <li>• No rubble or waste material associated with construction works should be dumped into the wetland depression areas (Belcher <i>et al</i>, 2021).</li> <li>• Where construction sites are located near the wetlands, all materials on the construction sites should be properly stored and contained (Belcher <i>et al</i>, 2021).</li> <li>• Disposal of waste from the site should be properly managed (Belcher <i>et al</i>, 2021).</li> <li>• The site office and construction camp, and all temporary toilets and solid waste disposal facilities, should be located at</li> </ul>

	<p>least 30 m from the edge of any wetlands (Belcher <i>et al</i>, 2021).</p> <ul style="list-style-type: none"> <li>• Disturbance and the use of machinery in the larger wetland areas, as well as the dumping of soil and other material into wetlands should preferably be avoided (Belcher <i>et al</i>, 2021).</li> <li>• Where soil is disturbed, alien vegetation should be controlled using appropriate methods such as removal with saws and herbicides (Belcher <i>et al</i>, 2021).</li> <li>• Construction work within or adjacent to the aquatic features should preferably take place before the onset of the rainfall period to ensure minimal impact on flow (Belcher <i>et al</i>, 2021).</li> <li>• Work within the Lotus Canal and wetland areas, particularly for the more sensitive wetland areas should be limited as far as possible in terms of their spatial and temporal extent and the disturbed areas rehabilitated immediately afterwards (Belcher <i>et al</i>, 2021).</li> <li>• Construction within or adjacent to the canal and wetland areas should as far as possibly take place during the drier months of the year (Belcher <i>et al</i>, 2021).</li> <li>• Any invasive alien plants or waste material should be removed from the canal and wetland areas during and after construction works is complete (Belcher <i>et al</i>, 2021).</li> <li>• Rubble and debris from existing structures and construction activities should be removed after construction is complete so as not to impede runoff to the aquatic features (Belcher <i>et al</i>, 2021).</li> <li>• Storm water runoff along the road should be incorporated into the road upgrade designs and adequately mitigated.</li> <li>• Stormwater mitigation measures should be put in place along the road.</li> <li>• The following general guiding principles should be followed during the construction phase and any maintenance needed (Belcher <i>et al</i>, 2021): <ul style="list-style-type: none"> <li>○ Minimise the spatial extent of disturbance and maximise physical diversity;</li> <li>○ Minimise the frequency of, or requirement for, maintenance activities;</li> <li>○ Minimise upstream/downstream impacts;</li> <li>○ Do not impede the movement of aquatic and riparian biota;</li> <li>○ Minimise alterations to flow- and sediment-capacity;</li> <li>○ Rehabilitate and re-vegetate after construction;</li> <li>○ Clear alien plant species;</li> <li>○ Maintain aquatic ecosystem minimum base flow at all times;</li> <li>○ Maintenance activities are best done during the dry season;</li> <li>○ Whenever possible existing access routes should be used;</li> <li>○ All potential pollutants should be kept away from aquatic ecosystems;</li> <li>○ Spoil material should be removed to approved dumping sites;</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>○ After construction, any areas within the maintenance footprint that have been degraded from their condition prior to construction and as a result of the construction activities must be restored to their former condition;</li> <li>○ Channelization or canalization is actively discouraged;</li> <li>○ Valuable habitats should be retained; and</li> <li>○ Cleared plant material must be removed from aquatic ecosystems.</li> </ul> <ul style="list-style-type: none"> <li>● Increased sedimentation or turbidity at each of the construction works within the aquatic features should be mitigated as far as possible by making use of sandbags, settling ponds or screens to minimise the load of sediment being washed downstream of the works (Belcher <i>et al</i>, 2021).</li> <li>● Contaminated runoff from the construction site(s) should be prevented from entering the aquatic features within the immediate area, the laydown area and main construction site(s) for the aquatic features (Belcher <i>et al</i>, 2021). This applies also to discharge of effluents or polluted water, including sediment-laden water from the dewatering of construction areas (if carried out).</li> <li>● All construction machinery and vehicles should be checked for oil and fuel leaks every day, before they are allowed to enter the road reserve or adjacent areas nearby the ESNR. If any machinery or vehicles are found to have an oil or fuel leak, they must not be allowed to enter within 20 m of the edge of the ESNR until the leaks have been rectified.</li> <li>● No fuel storage, refuelling, vehicle maintenance or vehicle depots should be allowed within 50 m of the edge of the ESNR. Refuelling and fuel storage areas, and areas used for the servicing or parking of vehicles and machinery, should be located on impervious bases and should have bunds around them (sized to contain 110% of the tank capacity) to contain any possible spills.</li> <li>● Washing of vehicles, machinery, plant or equipment is strictly prohibited on the site.</li> <li>● All stockpile of building materials (e.g. sand) must be protected so as to prevent erosion by wind and water. Stockpiles should not be higher than 1.5m.</li> <li>● No spoil material, including excavated soil, should be temporarily stockpiled within any wetland areas outside of the road reserve and all soil stockpiles should be covered (e.g. with geotextile or plastic sheeting) and not exceed a maximum height of 2 m. Where the temporary stockpiling of spoil material in wetland areas outside the road reserve is unavoidable, such stockpiling should be specifically authorised by the ECO and subject to a Method Statement.</li> </ul>
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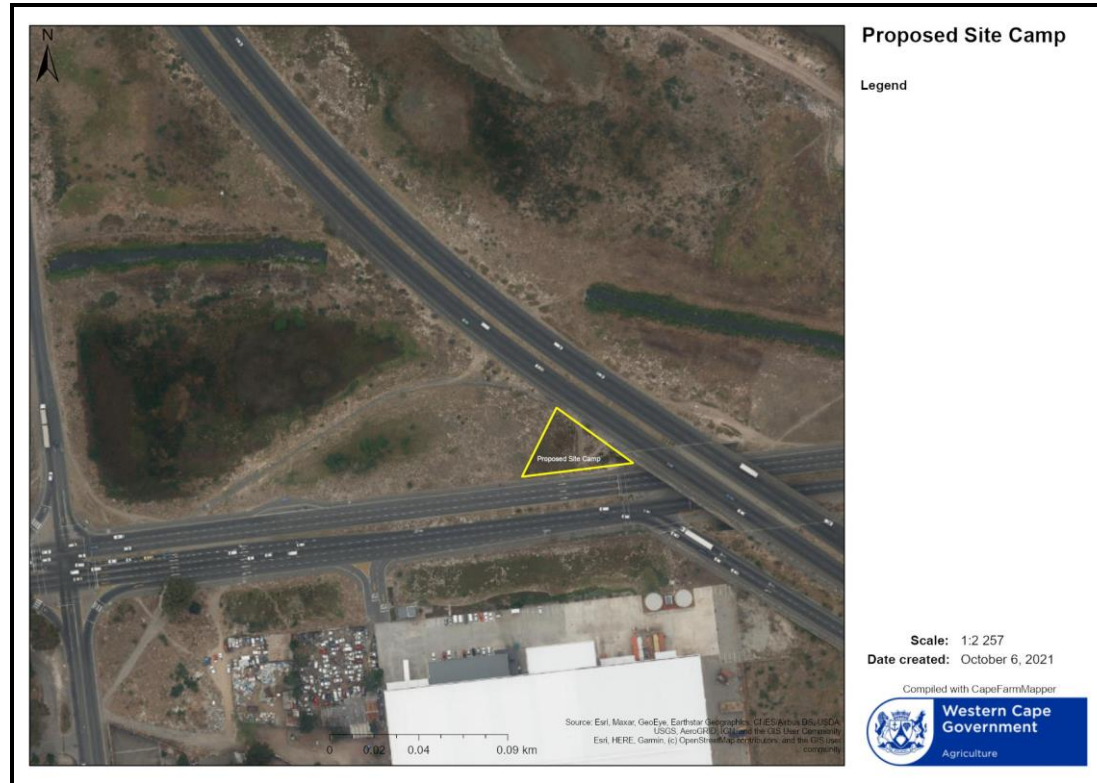
<p><b>Prevention of soil and ground water pollution</b></p>	<ul style="list-style-type: none"> <li>• The Contractor shall prevent pollution of surface or ground water as a result of construction activities. Such pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage, water from excavations, construction water, water carrying soil or other particles or waste products, etc.</li> <li>• No residues from cleaning activities or any other form of contaminated water may be released onto bare soil or into vegetated areas. Such wastewater must be appropriately contained and disposed.</li> <li>• Any incident that may result in the pollution of a water resource must be reported to the Department of Water and Sanitation immediately.</li> <li>• Cement powder has a high pH. Spillage of dry cement powder and concrete slurry will affect both soil and water pH adversely. The permitted location of the batching plant (including the location of cement stores and sand and aggregate stockpiles) shall be indicated on the site layout plan and approved by the ECO.</li> <li>• Cement is to be stored in a secure weatherproof location to avoid contamination of the environment.</li> <li>• Stormwater must be managed in terms of the approved comprehensive Stormwater Management Plan.</li> <li>• All runoff from batching areas shall be strictly controlled so that contaminated water does not enter stormwater, or groundwater or any water courses. Dagga boards and mixing trays should be used at all mixing and supply points.</li> <li>• Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment.</li> <li>• Settling tanks for the evaporation of contaminated water should be constructed with an impermeable surface. Sediment should be left to dry out before being removed to the hazardous waste skip.</li> <li>• No watercourse in the greater area shall be used for disposal / dumping of any material or substance under any circumstances, even temporarily.</li> <li>• Servicing of vehicles or machinery is strictly prohibited on the site.</li> <li>• All maintenance of plant shall be performed off site. If it is necessary to do emergency repairs on site, the Contractor shall obtain the approval of the Engineer and ECO prior to commencing activities and ensure that there is no contamination of the surrounding soil or vegetation by using drip trays to collect waste oil and other lubricants.</li> <li>• Drip trays shall be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles). Drip trays shall be inspected and emptied daily and serviced when necessary. In particular, drip trays shall be closely monitored during rain events to ensure that they do not overflow. Drip trays must be free of cracks/ holes / punctures to ensure no spillage from these receptacles.</li> <li>• Stationary equipment (such as generators etc.) must also be placed inside drip trays whilst in use.</li> <li>• The washing of equipment shall be restricted to urgent or preventative maintenance requirements only. A Method Statement shall be required for all wash areas where hydrocarbon, hazardous materials and pollutants are expected to</li> </ul>
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	<p>be used. This includes, but is not limited to, paint equipment cleaning.</p> <ul style="list-style-type: none"> <li>• Wash areas for domestic use shall ensure that the disposal of contaminated “grey” water is sanctioned by the Engineer.</li> <li>• Water containing potential pollutants such as cements, concrete, lime, chemicals, fuels and hydrocarbons shall be contained and discharged into an impermeable storage facility for evaporation and ultimate removal from the site or for recycling. This particularly applies to water emanating from concrete batching plants and concrete swills, and to runoff from hydrocarbon storage areas. Under no circumstance may contaminated water be discharged into the watercourses in the greater area.</li> <li>• Contaminated runoff should be prevented from entering the stormwater system. The stormwater systems must be protected from contaminated runoff and/or fine material entering these systems by the installation of temporary sumps which must act as 'grease' and silt traps.</li> <li>• The site office, toilets, material storage/stockpiling, storage or stockpiling of spoil material and all temporary waste storage areas should be located at least 30 m away from any watercourse and in areas approved by the ECO.</li> <li>• Bulk storage of fuel/hydrocarbons is strictly prohibited, and the temporary storage of such substances will be limited as far as possible. Note that storage of fuel in volumes greater than 200litres is subject to a flammable substance permit, obtainable from the local fire chief. All storage areas for such substances shall be bunded, covered and have an impermeable surface and shall be located in areas approved by the ECO.</li> <li>• Refuelling of plant/equipment must be undertaken on a concrete platform with secondary containment. The necessary decanting equipment must be used to prevent spills and leaks whilst refuelling.</li> </ul>
<b>Spills and spill control</b>	<ul style="list-style-type: none"> <li>• A Method Statement must be put in place for the handling of spills and leaks. The Contractor shall ensure that his employees are aware of the procedure to be followed in this regard and shall make the necessary materials and equipment for dealing with spills and leaks available on site at all times. Clean-up and remediation must occur immediately after a spill incident.</li> <li>• All fuel, oil or hydraulic fluid spills are to be reported to the Engineer or ECO immediately.</li> <li>• In the event of a hydrocarbon spill, the source of the spillage must be isolated, and the spillage contained. Should a leak emanate from equipment (such as earth moving equipment), the machinery shall be parked on a hard surface until such time as a repair can be made, to prevent contamination of bare ground.</li> <li>• The Contractor shall ensure that there is always a supply of appropriate material readily available to absorb/breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle the volume of a spill similar to the volume of the largest container on site used for storage of such substances that are not stored and / or used inside a bunded area. This material must be approved by the Engineer prior to any refuelling or maintenance activities.</li> </ul>



<p><b>Erosion prevention, sedimentation control and protection of stormwater and sewer system.</b></p>	<p>Erosion and sedimentation can occur due to the loss of vegetation, compaction of soils due to excavations, trampling by construction personnel and movement and storage of materials and machinery during the construction. The following mitigation measures must be put in place:</p> <ul style="list-style-type: none"> <li>• All run-off from hard constructed surfaces must be directed into the existing storm water run-off system, subject to compliance with City of Cape Town By-Laws associated with the treatment and water quality thereof.</li> <li>• Existing stormwater drains in access routes in closest proximity to the site shall be protected to prevent soil particles or other foreign substances entering the stormwater system.</li> <li>• Exposed surfaces should be compacted as quickly as possible.</li> </ul> <ul style="list-style-type: none"> <li>• The Contractor shall take all reasonable measures to limit erosion and sedimentation due to the construction activities. Where erosion and/or sedimentation occurs, whether on or off the site, despite the Contractor complying with the foregoing, rectification shall be carried out in accordance with details specified by the Engineer. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification shall be carried out to the reasonable requirements of the Engineer.</li> <li>• The Contractor shall be vigilant during periods where strong winds prevail (especially during the dry summer months) to manage dust generation in accordance with the Dust Control Regulations. No potable water shall be used for dust suppression purposes while water restrictions apply.</li> <li>• Prior to the start of construction, a system must be put in place to manage stormwater runoff from the site during the construction period. A stormwater management plan which complies with all of the regulations set out by the City of Cape Town must be drawn up by the engineers and submitted to the local authorities for approval. This must include specifications for stormwater management whilst construction activities area undertaken on site and must be incorporated into the related Method Statement.</li> <li>• No wastewater is to be discharged into the sewer system unless permitted by the relevant branch within the City of Cape Town.</li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<p><b>PROTECTION OF NATURAL FEATURES, FAUNA AND FLORA</b></p> <ul style="list-style-type: none"> <li>• <u>Management Statement and objective:</u> To ensure that no vegetative cover is removed and/or impacted on outside of the approved works area (i.e. the designated route corridor). To protect any protected plant species on the property and prevent impacts on fauna found on the site. To preserve the top layers of soil for use in the final landscaping. Appropriate temporary storage and stockpiling of topsoil to prevent erosion, sedimentation and dust pollution. To avoid intrusion into the adjacent natural areas and prevent related impacts.</li> <li>• <u>Impact Management Outcomes:</u> No removal of vegetation and/or other impacts on any vegetative cover in the area outside of the route corridor. No damage or defacing of any natural features situated in or around the site. No negative impacts on the breeding seasons of fauna found in the vicinity of the site (particularly within the ESNR). No harm or destruction of faunal habitats outside the road corridor or the death of any animals on the site or as a result of actions of removing fauna off site.</li> </ul>	
<p><b>General</b></p>	<ul style="list-style-type: none"> <li>• A Method Statement detailing the layout and method of establishment of the construction camp (including all buildings, offices, lay down yards, wash areas, fuel storage areas, batching areas and other infrastructure required for the running of the project) and indicating these in a drawing shall be submitted to the ECO for review and approval.</li> <li>• All site camps, laydown areas etc. must be located in already transformed areas (i.e. not within wetlands or biodiversity areas as indicated in Figure 9 and Figure 10). These must be "fit-for-purpose" i.e. not an open space but rather a hard surfaced fenced off area (Altern, 2021). <u>The proposed location for the site camp is erf 119091 and is delineated in yellow in Figure 23 below. This location is significantly transformed and is located within close proximity to the construction area. The final site determination must however be made by the ECO in conjunction with the contractors.</u></li> </ul>



**Figure 23. Proposed location of site camp (boundary delineated in yellow) within erf 119091 (created using CFM, 2021)**

- All construction areas must be clearly demarcated and the area outside of this to be labelled as “no-go areas” so as to prevent encroachment into areas not required for construction (Altern, 2021).
- The Contractor shall restrict all activities, materials, equipment and personnel to within the area specified.
- Movement of vehicles and personnel, stockpiling, dumping or storage of equipment or materials outside the designated working areas, termed as “no-go” areas, will not be permitted without written authorisation of the Engineer and ECO.

	<ul style="list-style-type: none"> <li>• No-go areas will be demarcated to the satisfaction of the Engineer and the ECO so as to prevent unauthorised entry into these areas.</li> <li>• No-go areas for this project include the ESNR as well as the adjacent neighbours, other than cases where property acquisition has been finalised.</li> <li>• No storm water is to be discharged into natural vegetation, including the ESNR. Roadside Kerbs and gutters are to be used to channel run-off into the existing storm water system (Altern, 2021)</li> <li>• The Contractor shall not deface, paint, damage or mark any natural features situated in or around the site for survey or other purposes unless agreed beforehand with the Engineer. Any features affected by the Contractor in contravention of this clause shall be restored/ rehabilitated to the satisfaction of the Engineer.</li> <li>• The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including "no-go" areas) and required to comply with the specifications.</li> <li>• The Contractor shall ensure that delivery drivers are supervised during off loading, by someone with an adequate understanding of the requirements of the Specifications.</li> </ul>
<b>Site Clearance</b>	<ul style="list-style-type: none"> <li>• <u>A search &amp; rescue activity is to be undertaken by a qualified expert prior to commencement of construction activities, specifically to identify Species of Conservation Concern, particularly <i>Isoetes capensis</i>. All translocation activities for identified species (if required) must be done in consultation with CapeNature.</u></li> <li>• The road footprint and work area should be demarcated with poles and construction tape before construction commences and all vehicles and personnel restricted to within this area. Any work that may be required outside of this area should be supervised by the ECO.</li> <li>• Whenever possible existing access routes should be used.</li> <li>• Provision should be made for a sweep of the area prior to earth moving activities to relocate any toads encountered, in addition to any other faunal individuals encountered within the footprint during construction activities. These animals may be relocated to the ESNR and work with the Site Manager for the ESNR is encouraged in this regard.</li> <li>• Unnecessary disturbance of the soil shall be avoided in order to reduce the potential for erosion and changes to the drainage regime, as well as dust and noise generation which could lead to nuisance factors for the adjacent land users.</li> <li>• Burning of vegetative material will be strictly prohibited.</li> </ul>
<b>Management of potential disturbance to fauna</b>	<ul style="list-style-type: none"> <li>• It is strongly recommended that no major earth-moving activities are carried out adjacent to the ESNR during the Western Leopard Toad breeding season (August-September), or when toadlets are emerging from the breeding ponds (usually November-December).</li> </ul>

	<ul style="list-style-type: none"> <li>• Site inspections are to be conducted prior to the commencement of clearing activities so as to allow for any faunal species to be removed from the area.</li> <li>• If animal species are encountered in the course of site clearing or earth moving activities the ECO or the Site Engineer (if the ECO is not on site) must be consulted so that any animals vulnerable to injury can be moved.</li> <li>• Hunting of any animal species is strictly prohibited.</li> <li>• If any dangerous species are encountered, the ECO must be consulted regarding their removal and all contractor employees shall be moved away from the area until a professional can remove the animal in a safe manner.</li> <li>• There may be no interference or harassment of wild animal species. If wild animals are encountered, they should be avoided and not approached.</li> <li>• Assist (harmless) animals in moving: When animals are observed and they appear to be trapped or unable to escape to a safe area, they should be assisted in so doing. Animals that are potentially dangerous should be moved with the help of knowledgeable and experienced persons. It is recommended that the Cape Reptile Club (Secretary: Marcel Witberg: 082 784 7314) be approached for the contact details of a local person who would be able to be on site at short notice, should a situation arise. This person should be put on standby for the period of site clearance.</li> <li>• Do not leave holes and trenches open for extended periods of time. Holes and trenches should be left open for as short a period of time as possible, because such cavities act as pitfall traps for small animals.</li> <li>• Any temporary use areas such as construction camps and lay-down areas should be located away from the ESNR.</li> <li>• No excess soil, rock or other material should be dumped or stored temporarily in the ESNR.</li> <li>• It is recommended that construction should take place in late summer to minimize impact to the wetland. This is when faunal activity along the road alignment is likely to be lowest. In the wet season, faunal activity is likely to be higher and there is also significantly greater risk of large rainfall events resulting in erosion of loose soils and pollution of the wetland. In addition, drier conditions in late summer are likely to pose less of a risk to construction vehicles of getting stuck in the wetland or causing large amounts of disturbance due to the loose substrate.</li> <li>• No fires should be allowed within the site as there is a risk of fires spreading into the reed beds of the wetland.</li> <li>• All fuels, oils and other hazardous materials should be stored in the appropriate manner to prevent contamination of the ESNR. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill, including any polluted soils.</li> </ul>
<b>Management of potential disturbance to flora</b>	<ul style="list-style-type: none"> <li>• No locally indigenous flora may be used for landscaping unless from a guaranteed source within the study area i.e. originating from a natural population in the study area. This is to prevent genetic contamination of existing populations. If a species is moved outside of its natural range and into that of a closely-related species, problems associated with competition and hybridisation (when two varieties or species interbreed to form a hybrid or "mix") could result (Esler,</li> </ul>

	<p>Pierce &amp; De Villiers, 2014, Pg. 151 of Altern 2021).</p> <ul style="list-style-type: none"> <li>• Except to the extent necessary for the carrying out of the works and any landscaping contract, vegetation shall not be removed, damaged or disturbed nor shall any vegetation be planted unless this is done in accordance with the approved Landscaping Plan for the development or in terms of the necessary permit obtained from the City of Cape Town Parks branch for the removal of trees.</li> <li>• No materials containing invasive plant seeds, litter or contaminants may be imported. The Supplier shall be informed of the sites of origin of imported gravel, sand, stone, etc. and shall have the authority to reject imported material if deemed necessary.</li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>PROTECTION OF ANY PALEONTOLOGICAL AND ARCHAEOLOGICAL RESOURCES</b> <u>Management Statement and objective:</u> Protection of archaeological and/or palaeontological resources on, or adjacent to the site. <u>Impact Management Outcomes:</u> No non-conformances and no impacts on such resources.	
<b>General</b>	<ul style="list-style-type: none"> <li>• The field supervisor/foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential fossil and buried archaeological material.</li> <li>• Should any heritage resources, including evidence of grave, human burials, archaeological material, and paleontological material be discovered during the excavation of activities above, all works must be stopped immediately, and the ECO notified who should notify Heritage Western Cape (HWC) without delay. Failure to notify the ECO of a find will result in a penalty. The ECO should also notify a relevant specialist (e.g. palaeontologist) to determine the way forward. The appropriate procedures for the relevant fossil-finds as detailed below must be followed, should anything of an archaeological nature be found on site by the Contractor (or any other party).</li> <li>• This aspect must be carefully explained to workers during the Environmental Education Programme undertaken by the ECO.</li> <li>• The ECO will advise on demarcation of this area and notify a relevant specialist to view material and ascertain whether further study of the area is required.</li> <li>• If any human remains are discovered during earth moving activities, they are to be treated with respect and the South African Police Service contacted immediately. Should the SAPS indicate that the remains are older than 60 years, SAHRA should be notified. An archaeologist should be contracted to remove such remains at the expense of the developer.</li> </ul>



	<p>A maximum of 30 days should be set-aside in the construction program for the recovery of archaeological material where/if discovered. The contact details for the SAHRA are as follows:</p> <p>111 Harrington Street, Cape Town, 8001  P O Box 4637, Cape Town, 8000  Tel: (021) 462 4502  Fax: (021) 462 4509  Email: <a href="mailto:director@sahra.org.za">director@sahra.org.za</a></p> <ul style="list-style-type: none"> <li>With respect to the <i>Eucalyptus</i> grove remnant indicated in Figure 17, ensure planting of new suitable trees in appropriate road reserve positions suggested by a Landscape Architect is carried out.</li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>NOISE MANAGEMENT</b>  <u>Management Statement and objective:</u> To avoid and/or minimise impacts on the adjacent residential communities and ensure that any such impacts are appropriately dealt with to prevent further impacts in the longer term. To provide a forum for any Interested and/or Affected Parties to raise their concerns and log complaints for remediation action and prevention of similar incidents. <u>Impact Management Outcomes:</u> No disruptions or nuisance to adjacent communities caused by noise from the construction site. Effective complaints handling. No repeat complaints received	
<b>Management of potential noise disturbance</b>	<p>Noise, at a level typically associated with construction activities, would be experienced by surrounding land users as well as the users of the road during the course of construction works</p> <ul style="list-style-type: none"> <li><u>Noise generated on site from all the proposed activities must comply with the Western Cape Noise Control Regulations Provincial Notice 200/2013.</u></li> <li>The Contractor's attention is drawn to the Noise Regulations as promulgated in terms of the Environment Conservation Act and relevant Local Authority bylaws.</li> <li>All noise and sounds generated by machinery must adhere to SABS 0103 specifications for the maximum permissible noise levels for construction in residential areas.</li> <li>In terms of noise legislation, a noise exemption permit needs to be obtained if the limits as contemplated in legislation will be exceeded for any given period of time. This requires obtaining of signatures from affected parties within a 150m radius of a site.</li> <li>Working hours must be restricted to normal daily working hours considered in the construction regulations. Should works</li> </ul>

	<p>be necessitated outside of these hours, surrounding residents must receive timeous notification.</p> <ul style="list-style-type: none"> <li>• Machinery to be fitted with silencers and no sound amplification equipment such as sirens, loud hailers and hooters may be used on site except in emergencies.</li> <li>• No amplified music shall be allowed on site.</li> <li>• No noise generating work may take place at night unless prior approval was granted by the local municipality and notification was sent to the surrounding residents.</li> <li>• The Contractor shall take preventative measures, such as screening, muffling, timing and pre-notification of affected parties to minimise complaints regarding noise.</li> <li>• The Contractor shall control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes/haul roads, so as not to cause an undue environmental damage.</li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>DUST MANAGEMENT</b>  <u>Management Statement and objective:</u> No unacceptable levels of dust. To avoid and/or minimise impacts on the adjacent road network and communities and ensure that any such impacts are appropriately dealt with to prevent further impacts in the longer term. To prevent wind and water erosion and/or sedimentation of any natural features. To provide a forum for any Interested and/or Affected Parties to raise their concerns and log complaints for remediation action and prevention of similar incidents. <u>Impact Management Outcomes:</u> No disruptions to traffic, no nuisance to adjacent communities caused by dust. Effective complaints handling. No repeat complaints received.	
<b>Prevention of dust nuisance</b>	<ul style="list-style-type: none"> <li>• <u>Dust generated from all the phases of the proposed activities must comply with the NEM: AQA, National Dust Control Regulations (Government Notice No. R. 827) of 1 November 2013, all Local Authority Bylaws as well as the National Dust Control Regulations, Notice R.827 of 2013 and must be adhered to. These regulations prohibit a person from conducting any activity in such a way as to give rise to dust in such quantities and concentrations that the dust, or dust fallout, has a detrimental effect on the environment, including human health.</u></li> <li>• <u>All potential air pollutants on site must be monitored and if causing significant emissions must be mitigated strictly as per this EMP</u></li> <li>• The Contractor shall take all reasonable measures to minimize any dust nuisance, pollution of streams and inconvenience to or interference with the public (or others) as a result of the execution of the works. A Method Statement will be required in this regard as determined by the Engineer and ECO.</li> </ul>

	<ul style="list-style-type: none"> <li>• During windy and dry conditions, dust suppression methods must be employed. NOTE: The use of potable water for dust suppression is not permitted when water restrictions are in place and discouraged even when water restrictions are not in place.</li> <li>• Stockpiles of materials as well as the loads on all trucks transporting any material that could lead to dust pollution should be covered with a tarpaulin or similar cover to minimise dust / windblown sand.</li> <li>• In extreme cases, a dust suppression product (e.g. dustex) should be used. The product used must receive prior approval from a freshwater consultant.</li> <li>• During extremely high winds, dust generating activities should be avoided.</li> <li>• Excavation, handling and transport of erodible materials shall be avoided under high wind conditions or when a visible dust plume is present.</li> <li>• All access and haul routes/ roads shall be cleared from sand and/or mud or debris deposited by construction vehicles associated with this project.</li> <li>• The Contractor shall be responsible for any clean-ups resulting from the failure by his employees or suppliers to properly secure transported materials.</li> <li>• The Contractor shall take preventative measures, such as screening, dust control, timing and pre-notification of affected parties to minimise complaints regarding dust.</li> <li>• If, in the reasonable opinion of the ECO, excessive dust is noted or complaints regarding dust exceed 1 complaint a week, the ECO may request dust fallout monitoring to be undertaken to determine the need for additional control measures.</li> <li>• Particularly with respect to the cadastral boundary of ESNR, a silt screen of at least 1.5m high is to be erected along the boundary prior to the commencement of works in the area and is to remain in place until the conclusion of works. Note that this should be arranged in conjunction with the Site Manager of the ESNR.</li> <li>• The site should be swept regularly to ensure the roadway is clear of dust. More frequent sweeping during the windy months may be required.</li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<p><b>AESTHETICS (VISUAL)</b></p> <p><u>Management Statement and objective:</u> To ensure that visual impacts are avoided as far as possible, and where these cannot be altogether avoided, that it is reduced to acceptable limits.</p> <p><u>Impact Management Outcomes:</u> No unacceptable visual impacts occur as a result of construction activities.</p>	
<p><b>Site Housekeeping</b></p>	<ul style="list-style-type: none"> <li>• The Contractor shall take appropriate measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.</li> <li>• Should it be deemed necessary, the ECO may request that activities which may have a high visual impact be suitably screened off to the surrounding environment. Site construction hoarding / fencing should be dark in colour and free of excessive branding.</li> <li>• The Contractor shall supply and maintain adequate and suitable sheds or containers for the storage of materials. Sheds for the storage of materials that may deteriorate or corrode if exposed to the weather shall be weather-proof, adequately ventilated and provided with raised floors.</li> <li>• All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of the area disturbed.</li> <li>• The type and colour of roofing and cladding materials to the Contractor's temporary structures shall be selected to reduce reflection.</li> <li>• The Contractor shall ensure that any lighting installed on the site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other users of the area. Site lighting should be kept to a minimum and should not be flood type lighting where possible.</li> <li>• Neon, spot or up lighting are visually inappropriate. Light sources should be screened and filtered as far as possible.</li> <li>• Construction signage should not be excessively sized or located along sensitive visual corridors.</li> <li>• Excavation machinery and trucks should be stored and kept out of sight of surrounding residential areas and scenic routes where possible.</li> <li>• Site lighting during construction should be kept to a minimum and should not be flood type lighting where possible.</li> <li>• Construction signage should not be excessively sized or located along sensitive visual corridors.</li> <li>• Excavation machinery and trucks entering and leaving the site should take care not to leave rubble, sand, rock,</li> </ul>

branches and the like on roads linking to the site.

ISSUE	MANAGEMENT / MITIGATION MEASURES
<p><b>HAZARDOUS SUBSTANCES MANAGEMENT</b>  <u>Management Statement and objective:</u> To prevent pollution or fire associated with the handling storage and use of materials deemed hazardous to human health or the environment.  <u>Impact Management Outcomes:</u> No non-conformances and no pollution of soil, groundwater and/or stormwater as a result of the construction activities. No fires as a result of the handling / use of fuel.</p>	
<p><b>Hazardous substances handling, use and storage</b></p>	<ul style="list-style-type: none"> <li>• No fuel storage, refuelling, vehicle maintenance or vehicle depots should be allowed within 50 m of the edge of any wetlands.</li> <li>• All fuel is to be stored within a demarcated area. No refuelling of vehicles or machinery is to take place outside of this demarcated area unless authorised by the Engineer. The Engineer shall be advised of the area that the Contractor intends using for the storage of fuel.</li> <li>• The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut. Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.</li> <li>• Tanks containing fuels shall be situated on a smooth impermeable surface (plastic or concrete) base with a bund (if plastic, it must have sand on top to prevent perishing) to contain any possible spills and prevent infiltration of fuel into the ground. The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 110% x the total capacity of the largest storage tank / vessel inside the bund.</li> <li>• The floor of the bund shall be sloped towards an oil trap or sump to enable any spilled fuel to be removed. An Enretech or similar hydrocarbon absorption/remediation product approved by the ECO shall be installed in the sump to reduce the risk of pollution. Bulk fuel storage and bunded areas shall have overhead cover to prevent rain from entering the bunded area.</li> <li>• The Contractor shall keep fuel under lock and key at all times.</li> <li>• Note that a Flammable Liquid License must be obtained for the storage of diesel volumes greater than 200 litres in terms of the City's related by-law. The local Fire Chief must be consulted for any other specific requirements.</li> <li>• If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank shall be stored in a waterproof container when not in use</li> </ul>

	<ul style="list-style-type: none"> <li>• When parked, a drip tray must be placed under the temporary fuel storage tanker (bowzer) to contain incidental drips and spills.</li> <li>• Refuelling must take place on a concrete / hard standing area or over a drip tray.</li> <li>• During fuel delivery, a trained individual must be present at all times during offloading of product. An emergency cut off switch must be installed to immediately stop fuel delivery should an accident occur. An anti-flash nozzle must be installed at the end of the vent pipe with a fuel dispenser equipped with an automatic cut off switch to prevent fuel tank overfills.</li> <li>• Areas for storage of fuels and other flammable materials shall comply with standard fire safety regulations and may require the approval of the municipal fire prevention officer.</li> <li>• Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction shall be stored in secondary containers.</li> <li>• The relevant Material Safety Data Sheets (MSDS) shall be available on site.</li> <li>• Procedures detailed in the MSDSs shall be followed in the event of an emergency situation.</li> <li>• If potentially hazardous substances are to be stored on site, the Contractor shall provide a Method Statement detailing the substances/ materials to be used, together with the storage, handling and disposal procedures of the materials.</li> <li>• No paint products and chemical additives and cleaners such as thinners and turpentine, may be disposed of on site. Brush / roller wash facilities shall be established to the satisfaction of the Engineer. A Method Statement, approved by the Engineer, is required.</li> </ul>
ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>SITE ACCESS, ACCESS ROUTES AND TRAFFIC MANAGEMENT</b>  <u>Management Statement and objective:</u> To avoid and/or minimise impacts on the adjacent road network and road users any such impacts are appropriately dealt with to prevent further impacts in the longer term. To avoid construction related impacts associated with the movement of construction vehicles on adjacent residents. <u>Impact Management Outcomes:</u> No disruptions to traffic or adjacent residents, no damage to vehicles and related claims and no nuisance to adjacent communities caused by dust.	
<b>General</b>	<ul style="list-style-type: none"> <li>• Whenever possible existing access routes should be used.</li> <li>• Any work that needs to be undertaken in areas outside of the road reserve should be closely monitored by the ECO and should be carried out within the approved development footprint.</li> <li>• The access to ESNR should, at all times, remain open.</li> <li>• Access to the site must be carefully managed to avoid unauthorised entry onto the site, and to prevent loitering of</li> </ul>

	<p>construction contractors beyond the development area. Appropriate fencing must be installed in this regard at site establishment phase. Active access control must also be undertaken.</p> <ul style="list-style-type: none"> <li>• The Contractor shall control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and comply with all relevant laws and specifications. In addition, such vehicles and plant shall be so routed and operated as to minimise disruption to regular users of the routes not on the site. A traffic management plan/Method Statement shall be prepared, approved by the ECO and Engineer, and implemented for the duration of construction.</li> <li>• All construction vehicle movement shall as far as possible be limited to off-peak hours wherever possible. Delivery of materials or collecting waste shall be scheduled outside of peak periods.</li> <li>• The vehicles of the Contractor and his suppliers shall not exceed the 40km/h speed restriction within the site and surrounding road network.</li> <li>• Where necessary, additional traffic control measures should be implemented.</li> <li>• Construction of the infrastructure is to be undertaken as part of one construction contract of a limited duration to prevent protracted construction impacts to parties along the affected section of the road.</li> <li>• Subsequent to construction works, all access routes must be inspected and any repairs necessary as a result of the construction of the roadway must be undertaken.</li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>LABOUR RELATIONS, FACILITIES AND SITE HEALTH AND SAFETY</b> <u>Management Statement and objective:</u> To ensure the safety of all site personnel as well as the adjacent land users. <u>Impact Management Outcomes:</u> No injuries / incidents on site and emergency situations managed effectively. No safety breaches.	
<b>Employment</b>	<ul style="list-style-type: none"> <li>• Make use of previously disadvantaged individuals for the bulk of the unskilled labour as well as for the skilled labour, where feasible and in accordance with City of Cape Town procurement processes and requirements.</li> </ul>
<b>General safety</b>	<ul style="list-style-type: none"> <li>• Environmental awareness training courses shall be run for all personnel on site. All new staff and sub-contractor's employees that spend more than 1 day a week or four days in a month must attend the environmental education program within 1 (one) week of commencement of work on site. All attendees shall remain for the duration of the course and sign an attendance register on completion that clearly indicates participant's names, a copy of which shall be handed to the engineer.</li> </ul>



	<ul style="list-style-type: none"> <li>Telephone numbers of emergency services, including the local firefighting service, shall be posted conspicuously in the Contractor's office near the telephone.</li> </ul>
<b>General site security</b>	<ul style="list-style-type: none"> <li>No unauthorised firearms are permitted on site and access to the work site by unauthorised persons is to be prevented by the Contractor as far as is practical.</li> <li>The work site is to be secured and access by members of the public is to be prevented.</li> <li>The Occupational Health and Safety Act (Act 85 of 1993) and in particular the requirements of the Construction Regulations issued in July 2003, must be complied with.</li> <li>With the possible exception of any security staff who may be required to stay overnight at the Contractor's camp, no personnel will be permitted to live on site.</li> <li>Security staff must be provided with heating and cooking facilities (in order that they do not need to light fires), access to toilet facilities and communication equipment.</li> <li>Any security lighting at the Contractor's Camp is to be placed in such a way as to not cause a nuisance to residents of the area or interfere with road and traffic on adjacent roads or the adjacent natural areas.</li> </ul>
<b>Trenching</b>	<ul style="list-style-type: none"> <li>Any trenching required for the provision of services to the site shall be done in an environmentally sensitive manner.</li> <li>Trenching for services should be done in accordance with the engineering specifications (SANS 1200DB).</li> <li>Trenching shall be kept to a minimum.</li> <li>The planning and selection of trench routes shall be undertaken in liaison with the Engineer and cognisance should be given to minimising the potential for soil erosion.</li> <li>Trench routes within permitted working areas shall be clearly defined and marked beforehand with, for example, painted stakes.</li> <li>Trench lengths shall be kept as short as practically possible before backfilling and compacting.</li> <li>Trenches shall be re-filled to the same level as (or slightly higher to allow for settlement) the surrounding land surface to minimise erosion. Excess soil shall be stockpiled in an appropriate manner.</li> <li>Where there is a particularly high erosion risk, anti-erosion measures shall be implemented e.g. a fabric such as Geojute (biodegradable). In addition, the ECO and Landscape Architect must be consulted if the removal of any landscape planting is unavoidable.</li> <li>Measures should be instituted to safeguard workers in service trenches from collapse of the sidewalls of the trenches (see safeguarding measures below).</li> <li>Trenches should be safeguarded against the collapse of sidewalls by means of support plates against the walls which</li> </ul>

	<p>in turn is mounted with support arms. The support plates / panels should be adjustable to accommodate trenches of various depths.</p> <ul style="list-style-type: none"> <li>Subsurface services should be designed and constructed so that they are located sufficiently far from buildings that their backfilled trenches do not interfere with the foundations of other structures.</li> </ul>
<b>Ablution facilities</b>	<ul style="list-style-type: none"> <li>Sanitary facilities shall be located within 150m from any point of work, but not closer than 30 m from any wetland identified in Figure 13.</li> <li>Washing, whether of the person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided.</li> <li>The Contractor shall provide suitable sanitary arrangements at the Contractor's Camp and approved points around the designated work area to allow easy access to all employees on site.</li> <li>No staff members are permitted to commence with work on a site without suitable toilet facilities available for them.</li> <li>One chemical toilet is to be provided on site for every 30 contract personnel at each working area. These toilets must have doors and locks and shall be secured to the ground to prevent them blowing over. Toilet paper shall always be provided.</li> <li>Toilets are to be emptied as and when required and always prior to builders' holidays.</li> <li>The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site.</li> <li>Discharge of waste from toilets into the environment and burial of waste is strictly prohibited.</li> <li>The Contractor shall maintain the toilets in a clean, neat and hygienic condition. If the Contractor fails to provide and/or maintain all site sanitation facilities in a clean and hygienic condition, the Engineer may order the Contractor to suspend any or all work on the site until these requirements are met. No payment shall be made for any delays or disruption of the works caused thereby nor shall extensions of time be granted for such delays.</li> </ul>
<b>Eating Areas</b>	<ul style="list-style-type: none"> <li>The Contractor shall designate eating areas to the approval of the Engineer which shall be clearly demarcated. Sufficient tamper- and wind- proof bins shall be present in this area.</li> <li>The Contractor shall erect and maintain information posters for the information of his employees depicting actions to be taken to ensure compliance with aspects of the Specifications. Such posters shall be erected at the eating areas and any other locations specified by the Engineer.</li> </ul>
<b>Drinking Water</b>	<ul style="list-style-type: none"> <li>The Contractor shall ensure that drinking water is available for all staff on site. If no potable water source is available on site, then the Contractor shall import drinking water to the site.</li> </ul>

<b>Working Hours</b>	<ul style="list-style-type: none"> <li>Working hours must be restricted to normal daily working hours considered in the construction regulations and the National Building Standards SANS 10400:1990.</li> <li>If works are to take place outside of normal working hours, the ECO and the Engineer are to be notified and disturbance to the surrounding land users is to be prevented.</li> <li>Note that legislation requires the Contractor to obtain approval for carrying out works at night. This entails obtaining signatures from everyone within a 150m radius of a site. Furthermore, the Engineer will, where required, notify the Relevant Authority of work done outside of normal working hours.</li> </ul>
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ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>INCIDENT MANAGEMENT</b>  <u>Management Statement and objective:</u> To guide the way in which emergencies and/or environmental incidents are handled on site and remediate any damage appropriately. To prevent the starting of fires on site.  <u>Impact Management Outcomes:</u> No non-conformances and no adverse impacts on the environment as a result of emergency situations and/or environmental incidents. No fires started on the site.	
<b>General</b>	<ul style="list-style-type: none"> <li>Method Statements are required for the management of fire incidents as well as for accidental leaks and spills.</li> </ul>
<b>Prevention of fires</b>	<ul style="list-style-type: none"> <li>No fires shall be permitted on site. Notices are to be prominently displayed that no fires are allowed. Any fires that occur, shall be reported to the Engineer immediately.</li> <li>Burning is not permitted as a waste disposal method.</li> <li>Smoking shall only be permitted in designated smoking areas, depicted by the appropriate signage. Such areas shall not be located close to fire hazards. Notices are to be prominently displayed prohibiting smoking in areas that are deemed fire hazards. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame.</li> <li>The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it.</li> <li>A fire evacuation route is to be clearly demarcated and kept clear of obstruction at all times. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire.</li> </ul>

	<ul style="list-style-type: none"> <li>• The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall forward the name of the Fire Officer to the Engineer for his approval seven days prior to the date of the environmental awareness training course.</li> <li>• The Contractor shall supply all site offices, kitchen areas, workshop areas, materials, stores and any other areas identified by the ECO with tested and approved firefighting equipment. Firefighting equipment is to be maintained in good working order.</li> <li>• Welding, gas cutting or cutting of metal will only be permitted within specifically designated and adequately marked areas on the site. These sites are to be approved by the ECO.</li> <li>• All flammable material is to be stored in a suitable lockable storage area and combustible materials may not accumulate on site.</li> <li>• Symbolic safety signs depicting "No Smoking", "No Naked Lights" and "Danger" are to be provided, and are to conform to the requirement of SABS 1186. The volume capacity of any fuel tanks shall be displayed. The product contained within the tank shall be clearly identified; using the emergency information system detailed in SABS 0232 part 1. Any electrical or petrol-driven pump shall be equipped and positioned, so as not to cause any danger of ignition of the product.</li> <li>• In the event of a fire emergency: <ul style="list-style-type: none"> <li>○ The site supervisor or worker should sound the fire alarm;</li> <li>○ The site supervisor or worker should notify the City of Cape Town (107 from a landline and 021 480 7700 from a cell phone), Mitchell's Plain Fire Station (021 444 3090), or the Gugulethu Fire Station (021 444 5480);</li> <li>○ All workers on site should go to the designated emergency assembly point;</li> <li>○ The Fire Officer shall do a head count of all workers and ensure all personnel are present; and</li> <li>○ When the Fire Brigade arrives, the Fire Officer shall provide them with all the information they require regarding the incident.</li> </ul> </li> </ul>
<b>Accidental Leaks and Spillages</b>	<ul style="list-style-type: none"> <li>• The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Engineer and the relevant authorities.</li> <li>• Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Engineer.</li> <li>• The site shall have a suitable number of spill kits available. A spill kit (with the supply of absorbent material) shall be readily available at works areas to absorb any emergency hydrocarbon spills, and where possible be designed to encapsulate minor hydrocarbon spillage. There are a number of products on the market, which are designed and suitable as absorbents and encapsulators of hydrocarbons. The following are examples of those products used to contain incidental spillage:</li> </ul>

	<ul style="list-style-type: none"> <li>- Spill-Sorb – oil and chemical absorbent and encapsulating products</li> <li>- Drizzat Pads</li> <li>- Enretech Powder – absorbent and encapsulator</li> <li>- Peat moss</li> </ul>
	<ul style="list-style-type: none"> <li>• Treatment and remediation of spill areas shall be undertaken to the satisfaction of the ECO. In the event of a spill: <ul style="list-style-type: none"> <li>- The source of the spillage shall be isolated.</li> <li>- The Contractor shall contain the spillage using sand berms, sandbags, pre-made booms, and sawdust or other absorbent materials.</li> <li>- Cordon off and ensure safety of the spillage area.</li> <li>- Notify the Engineer, ECO and the Pollution Control Inspectorate (if serious spillage has occurred in a sensitive environment).</li> <li>- The ECO (in consultation with the Pollution Control Inspectorate where necessary) shall determine the need for further remedial actions.</li> <li>- All cleared materials will be treated as hazardous waste and disposed of as such, in accordance with the waste management specifications of this EMP.</li> <li>- Where spillage into ESNR occurs, the ECO, ESNR Site Manager, DEA&amp;DP, DWS and the City of Cape Town Environmental branch should be notified immediately.</li> </ul> </li> </ul>

ISSUE	MANAGEMENT / MITIGATION MEASURES
<b>RESOURCE USE (RAW MATERIALS AND RESOURCES)</b>	
<u>Management Statement and objective:</u> To prevent excessive and unnecessary use of natural resources and wasting of natural resources during the construction phase.	
<u>Impact Management Outcomes:</u> Development of an attitude towards a reduction in natural resources consumption where feasible and possible	
<b>Water Use</b>	<ul style="list-style-type: none"> <li>• Conduct activities in accordance with any water restrictions set by the local Municipality in terms of the applicable By-Law which may be in place at the time.</li> <li>• At the time of writing this document, the City of Cape Town was on the tail-end of a severe drought. With that in mind, Contractors are encouraged to use treated effluent water for construction activities as far as possible. Contractors may apply to the City for the use treated effluent water.</li> </ul>

	<ul style="list-style-type: none"> <li>○ Treated effluent can be supplied in three different ways:</li> <li>○ By connecting to the treated effluent pipe network;</li> <li>○ By hiring a metered treated effluent standpipe; and</li> <li>○ By collecting it directly from the wastewater treatment works.</li> </ul> <ul style="list-style-type: none"> <li>● To apply for supply of treated effluent water, residents should please visit the City's website: <a href="http://www.capetown.gov.za/treated-effluent">www.capetown.gov.za/treated-effluent</a>. This page outlines the application process and contains all relevant guidelines and forms, as well as copies of related by-laws for download.</li> <li>● The City's Water By-laws prohibit the use of drinking water for non-structural work such as dust control.</li> <li>● Where the use of potable water is required, such as for mixing of cement, the Contractor must submit an application for the use of potable water on site prior to starting construction.</li> <li>● As far as possible, limit the use of potable water to activities which require them.</li> <li>● It is suggested that a temporary storage tank for rainwater be set up at the construction camp, which could collect rainwater during the construction phase for use in the works.</li> <li>● Dripping taps/ leaking pipes should be addressed immediately to limit waste of water.</li> </ul>
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<b>Energy/Fuel Use</b>	<ul style="list-style-type: none"> <li>• Plant should not be left running while not in use.</li> </ul>
<b>Construction Materials</b>	<ul style="list-style-type: none"> <li>• Make use of locally supplied building materials where possible.</li> <li>• Reclaimed building materials should be used where possible.</li> <li>• In accordance with the integrated waste management approach to be followed through the construction phases of the development, materials used or generated by construction or the construction areas of other City of Cape Town projects nearby shall be re-used as far as possible.</li> <li>• No materials containing invasive plant seeds, litter or contaminants may be imported. The Supplier shall be informed of the sites of origin of imported gravel, sand, stone, etc. and shall have the authority to reject imported material if deemed necessary.</li> <li>• Durable building materials to increase the lifespan of the developments should be used.</li> <li>• Low VOC paints &amp; building materials should be used.</li> <li>• Adequate storage facilities for raw materials should be provided in order to minimise damage during construction works.</li> <li>• Where possible, suppliers with a green footprint or certification are to be used.</li> </ul>

ISSUE	MANAGEMENT / MITIGATION MEASURES
<p><b>SITE CLEANUP AND REHABILITATION</b></p> <p><u>Management Statement and objective:</u> To prevent impacts on the environment as a result of the conclusion of construction activities and any related impacts requiring rehabilitation actions prior to the contractors leaving the site.</p> <p><u>Impact Management Outcomes:</u> No non-conformances.</p>	
<p><b>Site clean-up and rehabilitation</b></p>	<ul style="list-style-type: none"> <li>Any disturbed aquatic habitat adjacent to the road works, particularly within the wetland areas adjacent to Edith Stephens Nature Reserve should be rehabilitated post-construction (Belcher, 2021).</li> <li>Any disturbed areas should be revegetated post-construction phase to reduce the risk of erosion – these areas should be monitored and kept free of invasive alien plant growth (Belcher <i>et al</i>, 2021).</li> <li>The area should be rehabilitated to resemble that of the surrounding bed and banks and where necessary vegetated preferably with indigenous grasses such as fynkweek <i>Cynodon dactylon</i> and buffalo grass <i>Stenotaphrum secundatum</i>. Invasive kikuyu grass <i>Pennisetum clandestinum</i> should be removed wherever possible (Belcher <i>et al</i>, 2021).</li> <li>The disturbed areas should be reshaped and where necessary vegetated (invasive alien vegetation such as kikuyu grass should not be planted in these areas and any regrowth of the invasive grass in the wetland areas should be avoided) (Belcher <i>et al</i>, 2021).</li> <li>Any invasive alien plants or waste material should be removed from the canal and wetland areas after construction works are complete (Belcher <i>et al</i>, 2021).</li> <li>Any areas of intact natural vegetation outside the road reserve that are unavoidably disturbed when the road is constructed should be rehabilitated, under the guidance and supervision of a botanist with knowledge of wetland and fynbos rehabilitation.</li> <li>Disturbed areas should be rehabilitated immediately after construction in a particular segment is complete.</li> <li>No exotic or commercially available seed mixes may be used for rehabilitation of disturbed areas. The City's Biodiversity Management Branch should be consulted as to suitable plants and their availability. Suitable species which must come from a reputable supplier and grown from a guaranteed source in close proximity (25km) to the disturbed site must be used. Refer to the Design specifications above for a list of suggested appropriate plant species.</li> <li>After construction, any areas within the maintenance footprint that have been degraded from their condition prior to construction and as a result of the construction activities must be restored to their former condition.</li> <li>The Contractor shall ensure that all temporary structures, equipment, materials, waste and facilities used for</li> </ul>



	<p>construction purposes are removed upon completion of the project.</p> <ul style="list-style-type: none"> <li>• The site clean-up shall be to the satisfaction of the Engineer and the ECO.</li> <li>• Where appropriate, the Contractor shall employ a suitably qualified person to rehabilitate areas damaged by construction activities during the course of the project.</li> <li>• All construction scars are to be rehabilitated immediately after construction is complete, <u>including any scars to Public Open Spaces along the road alignment.</u></li> <li>• The Contractor's procedure for rehabilitation shall be approved by the ECO and the Engineer and where required, the Local Authority environmental representative.</li> </ul>
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### 3.4 PENALTIES AND BONUSES

Where the Contractor inflicts damage upon the environment or fails to comply with any of the Environmental Specifications contained within this EMPr, he shall be liable to pay a penalty for breach of the conditions of the Environmental Specifications which form part of the works contract.

The Contractor is deemed NOT to have complied with these Environmental Specifications if:

- There is evidence of contravention of the Environmental Specifications within the boundaries of the site, site extensions and haul/ access roads;
- Environmental damage ensues due to negligence;
- The Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time; or
- The Contractor fails to respond adequately to complaints from the public.

Penalties shall be issued per incident and per individual for the Contractor's responsibility. The amount of the penalty shall be determined by the Engineer, in consultation with the ECO. The Engineer shall inform the Contractor of the contravention and he shall notify the consulting quantity surveyor to deduct such a penalty from monies due under the Contract prior to the issuing of the monthly payment certificates.

Payment of any penalties in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

The following penalties (not an exclusive list) shall be issued in addition to any remedial costs incurred as a result of non-compliance with the Environmental Specifications and shall be imposed by the Engineer on the Contractor for contraventions of the Environmental Specifications by individuals or operators employed by the Contractor and/or his sub-contractors. Where there are ranges, the amount shall depend on the severity and extent of the damage done to the environment, as indicated in the table below:

OFFENCE	PENALTY
A Contractor fails to inform the ECO immediately of events that may cause serious environmental damage or breach the requirements of the EMPr	R 500
The Contractor fails to produce Method Statements on identified aspects of the project prior to commencement of that aspect	R 300 per Method Statement
The Contractor's Environmental Site File is incomplete/non-existent	R 500
The Contractor fails to keep activities within the site boundaries	R 1,000
Dust and/or erosion occurs because of lack of appropriate implementation of mitigation measures	R 200
Green waste is not disposed of at an approved waste site or composting facility	R400
Trespassing of people into no-go areas	R 500
Trespassing of machinery or equipment into no-go areas	R 500 – R 2 000
Delivery drivers are off-loading without supervision	R 300
Loads for transporting are unsecured or uncovered	R 500
Temporary storage of fuel used for construction purposes is not within	R 100- R1,000

specifications	
Fuel is dispensed with the incorrect equipment	R 400
Individuals are smoking in the vicinity of the fuel stores	R 200
Appropriate safety signs (e.g. Danger) are not displayed	R 200
There is a lack of firefighting equipment at the fuel stores	R 500
The storage areas fail to comply with standard fire safety regulations	R 200
Inadequate supply of material to absorb / breakdown and encapsulate minor hydrocarbon spillage	R 500- R1000
An integrated waste management system is not established	R 100- R1000
Waste is buried as a means of disposal	R 1000- R3000
There is evidence of littering	R 20 per item
Appropriate scavenger and weatherproof bins are not supplied	R 400- R1000
Bins are overflowing	R 150 per bin
Refuse is not removed or disposed of at an approved site	R 100-R1000
Empty cement bags are not removed from the construction area and placed under cover or discarded in the hazardous waste stream	R 500- R2000
Hazardous waste is not stored in an enclosed area	R 1000
Hazardous waste is not disposed of at a hazardous waste disposal facility	R 500 – R1000
Rubble is not appropriately stored in a skip or central stockpile	R 500
Materials that do not constitute clean building rubble are stored at the stockpiling site	R 200
An individual makes use of areas other than the designated facilities for ablutions	R 200
Latrine facilities and first-aid services are not in a sanitary condition	R 500
Insufficient provision of toilets	R 1000
Toilet waste (sewage) is discharged or buried in the environment	R 1000 – R2000
Potential pollutants are not stored safely away to prevent pollution of ground or surface water	R 500
Washing of vehicles or cement chutes occurs on site or in the vicinity of the ESNR	R 800
Hazardous chemical substances are not stored in secondary containers	R 800- R2000
Paint products, chemical additives or cleaners are being disposed of on site	R 200 – R 1500
Adequate sheds/ dry containers for the storage of materials are not provided	R 500
Maintenance of plant occurs on site when only emergency maintenance is permitted	R 200
Emergency maintenance is performed without efforts to prevent contamination of the surrounding environment	R 100 – R1500
Individuals fail to repair leaking equipment immediately	R 100 per item
Drip trays are not provided in construction areas under all relevant plant/equipment	R 100 – R500 per absent drip tray
Effective silencing devices are not in use to reduce noise impacts	R 50
Amplified music is heard on site	R 50
Failure to provide environmental awareness training to all site personnel	R 200 per staff member/ worker
Necessary Information posters (procedures for ensuring compliance) are not displayed	R 500
Lighting of fires occurs on site	R 200 – R 10 000
Smoking occurs outside of designated areas	R 20 – R 50
Unnecessary spillage of cement due to inadequate prevention measures, or haphazard working procedures	R 500 – R 1 500
Spillage of cement products are not rectified to the satisfaction of the ECO	R 50 – R 1000

Cement is not stored in a suitable weatherproof location	R 500
Polluted runoff is reaching groundwater/stormwater	R 200 – R 3 000
Screening and suitable containment is not in place /constructed in the concrete batching area	R 100 – R 500
Hydrocarbon spills are not isolated, contained, cleared and rehabilitated	R 100 – R 2 000
Appropriate safety precautions are not implemented	R 20 – R 1 000
Unauthorised firearms are present on site	R 1 000
Personnel other than security staff are living on site	R 1 000
An individual is not attempting to protect natural features during construction	R 50 – R 2 000
Individuals are swimming or washing (clothes, equipment etc.) in natural water bodies on or near the site	R 500- R1000
An individual's activities are resulting in the removal or damage of flora	R500- R1500
Animals are being trapped, poisoned, shot or harmed	R 100 – R 1 500
Erosion or sedimentation caused by construction is not rectified	R 400 – R 2 000
The ECO is not notified of heritage or archaeological remains found	R 1 000
Trenching is conducted without the specified environmental specifications	R 1000
Failure to avoid stormwater impacts through the adequate protection of stormwater inlets	R 100 per inlet
Unapproved materials are used for landscaping (e.g. invasive plant seeds)	R 50 – R 2000
All elements of the site are not removed during clean-up for closure	R 100 – R 3000
A specialist is not employed for rehabilitation where necessary	R 500- R2000
The site not fenced and/or demarcated as required	R 300- R3000
The site is not fully secured	R 50 – R 500
Water wastage	R 100 – R 1000
Method statements not appropriately and/or fully implemented	R 50 – R 300 per Method Statement
Speed limit on site not adhered to	R 100

Note that for each subsequent similar offence, the penalty shall be doubled in value to a maximum value of R 10 000.00.

The following penalties are suggested for transgression where damage has been done to the environment:

a	Erosion	A penalty equivalent in value to the cost of rehabilitation plus 20%
b	Oil Spills	A penalty equivalent in value to the cost of clean-up operation plus 20%
c	Damage to sensitive environments	A penalty equivalent in value to the cost of restoration plus 20%
d	Damage to archaeological finds	A penalty to a maximum of R 100 000 shall be paid for any damage to any archaeological sites/finds

All monies collected through penalties shall be held an environmental fund by the Developer and be accounted for. A summary page is to be included with the monthly payment certificates as a record of penalties issued to date. A portion of these funds may be used for token monetary bonuses to individual site staff members that have shown exceptional diligence in applying good environmental practice on the site. The remaining funds shall be allocated for the purposes of contributing to environmental education efforts in the local community e.g., for environmental books for the library, posters, excursions or trees for local schools or environmental resource material for the local public library. The Developer, in consultation with the ECO, Engineer and possibly

the local authority, will make a final decision regarding the precise allocation of all penalty funds. Documentation accounting for all penalty funds obtained and how these funds were utilized shall be copied to the City of Cape Town's Environmental Resources Management Unit and D: EA&DP, together with the environmental closure documentation on completion of the project.

### 3.5 MEASUREMENT AND PAYMENT

#### 3.5.1 Basic Principles

No separate measurement and payment will be made to cover the costs of complying with the provisions of these Environmental Specifications except in the case of the points noted below and as scheduled items. Such costs shall be deemed to be covered by the rates tendered for the items in the Schedule of Quantities completed by the Contractor when submitting his tender.

Some of the important cost items have been listed below to assist the Contractor in making provision for implementation of the Environmental Specifications. This list is by no means exhaustive and should only be used as a guideline.

- a. **Protection of stock piles from blowing or washing away:** The spraying or covering of stockpiles, including the supply of the spray or cover material, as required.
- b. **Trench shielding / protection:** Including all required support structures and resources required.
- c. **Storage of fuel and oils:** The supply, construction, installation, transport, upkeep and removal of all facilities required for storage and management of fuel and oils.
- d. **Cement-laden water management:** The supply, construction, installation, transport, upkeep and removal of all facilities required for the management of wastewater from concrete operations.
- e. **Contaminated water management:** The supply, construction, installation, transport, upkeep and removal of all facilities required for managing contaminated water.
- f. **Stormwater and flood management:** The supply, construction, installation, transport, upkeep and removal of all facilities required for managing storm water run-off from the site and protection of works from flooding.
- g. **Bunding and management of run-off from workshop areas and supply of drip trays for stationary and "parked" plant:** The supply, construction, installation, transport, upkeep and removal of all facilities required for bunding and managing the run-off from workshop areas as well as all drip trays required.
- h. **Prevention of harm to animals:** The supply and installation of drift fences and safe animal passages.
- i. **Dust management:** The supply, application, transport, upkeep and removal of all materials required to ensure that dust is adequately controlled.
- j. **Solid waste management:** The supply, application, transport, upkeep and removal of all materials required to ensure that solid waste is adequately controlled (including a waste sorting and recycling program).

- k. **Fire control:** The supply, transport, upkeep and removal of all material required for fire control.
- l. **Eating areas:** The supply, construction, installation, transport, upkeep and removal at the end of the construction of all eating areas structures.
- m. **Ablutions:** The supply, maintenance, regular emptying and removal of toilets.
- n. **Site demarcation:** The supply, installation and removal at the end of the construction of all temporary fences.

### **3.5.2 Scheduled items**

#### **(a) Provision of venue and staff attendance at the environmental awareness training course**

The provision of a venue and attendance at the environmental training course will be measured as a lump sum.

The sum shall cover all costs incurred by the Contractor in providing the venue and facilities and in ensuring the attendance of all relevant employees and sub-contractors, at the training.

#### **(b) Method Statements: additional work**

No separate measurement and payment will be made for the provision of Method Statements but, where the Engineer requires a change on the basis of his opinion that the proposal may result in or carries a greater than warranted risk of damage to the environment in excess of that warranted by the Environmental Specifications, then any additional work required, provided it could not reasonably have been foreseen by an experienced Contractor, shall be valued accordingly.

A stated sum is provided in the Schedule of Quantities to cover payment for such additional work.

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## **4. OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN**

### **4.1 SCOPE, RESPONSIBILITY AND AUDITING**

The environmental specifications contained in this section address the requirements for controlling the environmental impacts resulting from operational activities. Operational activities are limited for road infrastructure projects and only include maintenance of the roadway, road verges, street lighting and landscaping elements.

The responsibility of the implementation of the Operational EMPr lies with the applicant. The provincial environmental authorities may at any given time conduct site visits to audit compliance with these specifications.

Due to the limited nature of operational activities, independent compliance auditing by an environmental professional is not warranted during this stage.

It should be noted that the that City of Cape Town Roads and Stormwater Management branch will be maintaining all stormwater infrastructure assets.

For maintenance of the conduit and road drainage network, structural best management practices must be designed and constructed to facilitate and minimise operational and maintenance requirements.

### **4.2 OPERATIONAL SPECIFICATIONS:**

Specifications specific to the operation includes:

- Implementation and compliance to the Stormwater Management Plan for the project (noting that no storm water is to be discharged into natural vegetation (Altern, 2021) and roadside kerbs and gutters to channel run-off into the storm water system.
- Regular collection of litter on the sidewalk and roadway and general housekeeping to keep it clear of gross surface pollutants.
- Regular maintenance to the stormwater management systems on an ongoing basis should as a minimum include:
  - Physical inspection of the culvert outfall ends during rainfall events to verify that stormwater is being discharged from the system.
  - Regular cleaning of sedimentation from accessible points on the stormwater system, including stormwater catchpits and manholes, specifically prior to the beginning of the wet season.
  - Regular cleaning of gross pollutants such as plastic, paper, etc.

- Stormwater maintenance activities are best done during the dry season.
- Any signs of erosion along the road, particularly as a result of storm water runoff to the watercourse, should be identified and addressed as soon as possible (Belcher *et al*, 2021).
- In the longer term, the new integrated rapid transit system should address the stormwater runoff from the road into the aquatic features (Belcher *et al*, 2021).
- Implementation and compliance to the approved Landscape Management Plan for the project.

#### **4.3 MONITORING AND AUDITING**

Monitoring and auditing of the operational phase would be up to the discretion of the DEA&DP, given that the operational phase entails a road and that all listed activities would only be triggered during the construction/development phase and none triggered for the operational phase. However, it is recommended that a single audit be conducted by an independent professional six months from commencement of operation of the entire site in order to determine whether the impacts have been successfully mitigated. A report detailing the findings thereof should be provided to the DEA&DP, upon receipt of which, the DEA&DP would indicate the need and frequency for future operational audits.



## 5. REFERENCES

B. O'Donoghue. 2 August 2019. Proposed CCT IRT Road Works Govan Mbeki Road, Manenberg Cape Town Section between Vibra Road to the Eastern site terminus.

DEADP (2018), Western Cape Government Department of Environmental Affairs & Development Planning Directorate: Waste Management, Construction and Demolition Waste Management Guideline for Municipalities, March 2018.

GIBB. 9 April 2021. Contract No.: 59C/2014/15, IRT: Provision of Professional Services in Respect of the Design and Construction of the Phase 2A Trunk & Feeder Infrastructure (East). Local Stormwater Management Plan for the Southern Catchment Planning Region (Work Package E1- Addendum), J35437, Second Revision. GIBB (Pty) Ltd, Cape Town

S, Altern. 5 May 2021. Botanical Assessment of 59C/2014/15- IRT Phase 2A Trunk & Feeder Infrastructure: East- Vibra St – Sonwabile Dr. NCC Environmental Services, Westlake

T. Belcher, G, Grobler. S, Barrow, July 2021. Freshwater Impact Assessment Report for the Proposed Integrated Rapid Transit System on the Cape Flats: Phase 2A East- Lansdowne-Wetton Corridor for the Section of Govan Mbeki Road Between Heinz and Monwood. BlueScience, Somerset West

# APPENDIX 1

## METHOD STATEMENT TEMPLATE

### METHOD STATEMENT:

**CONTRACT:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**PROPOSED ACTIVITY** (give title of Method Statement and reference number from the EMPr):

**WHAT WORK IS TO BE UNDERTAKEN** (give a brief description of the works):

**WHERE ARE THE WORKS TO BE UNDERTAKEN** (where possible, provide an annotated plan and a full description of the extent of the works):

**START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:**

Start Date:

End Date:

**HOW ARE THE WORKS TO BE UNDERTAKEN** (provide as much detail as possible, including annotated maps and plans where possible):

**Note:** please give too much information rather than too little. Please ensure that issues such as emergency procedures, hydrocarbon management, wastewater management, access, individual responsibilities, materials, plant used, maintenance of plant, protection of natural features etc. are covered where relevant

## DECLARATIONS

### 1) RESPONSIBLE OFFICER (ECO/ ESO)

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

\_\_\_\_\_  
(signed) (print name)

Dated: \_\_\_\_\_

### 2) PERSON UNDERTAKING THE WORKS (Contractor)

I understand the contents of this method statement and the scope of the works required of me. I further understand that this method statement may be amended on application to other signatories and that the ECO/ ESO will audit my compliance with the contents of this method statement. I understand that this method statement does not absolve me from any of my obligations or responsibilities in terms of the Contract.

\_\_\_\_\_  
(signed) (print name)

Dated: \_\_\_\_\_

### 3) EMPLOYER (i.e. Developer/ Owner/Project Manager)

The works described in this method statement are approved.

\_\_\_\_\_  
(signed) (print name) (designation)

Dated: \_\_\_\_\_

## **APPENDIX 2**

### **CURRILULUM VITAE:**