

## **SITE RETURN BY LESSEE - GUIDELINES FOR:**

- 1. DEMOLITION**
- 2. EARTHWORKS**
- 3. TURFING**
- 4. AS-BUILT SURVEY**

*This document is prepared in July 2020 and serves as a guide only. The contents are subject to change.*

*Reference to any legislation is to be construed as references to that legislation as from time to time amended or to any legislation from time to time replacing, extending, consolidating or amending it.*

	Page
<b>SECTION 1 - DEMOLITION WORKS</b>	<b>1-1</b>
1.1	1-1
1.2	1-1
1.3	1-1
1.4	1-2
1.5	1-2
1.6	1-2
1.7	1-2
1.8	1-2
1.9	1-3
1.10	1-3
1.11	1-3
1.12	1-3
1.13	1-4
1.14	1-4
1.15	1-4
1.16	1-4
1.17	1-4
<b>SECTION 2 - EARTHWORKS</b>	<b>2-6</b>
2.1	2-6
2.2	2-6
2.3	2-6
2.4	2-7
2.5	2-7
2.6	2-7
2.7	2-7
2.8	2-8
2.9	2-8
2.10	2-8
2.11	2-9
2.12	2-9
2.13	2-9

CONTENTS

2.14	EARTH SLOPES	2-10
2.15	TOLERANCE OF FILL	2-10
2.16	FILLING GENERALLY	2-10
2.17	IMPORTED FILLING MATERIALS	2-10
2.18	UNSUITABLE MATERIALS	2-11
2.19	FILLING	2-11
2.20	COMPACTION	2-11
2.21	FILLING OF FOUNDATION PITS AND TRENCHES	2-12
2.22	FILLING IN EMBANKMENTS	2-12
2.23	FILLING ADJACENT TO CULVERTS AND RETAINING WALLS	2-12
2.24	FILLING INTO PONDS	2-12
2.25	FILLING INTO SWAMPS AND NEXT TO RIVER BANKS	2-13
2.26	FILLING AT SEAFRONT	2-13
2.27	GROUND FAILURE	2-13
2.28	SETTLEMENT	2-13
2.29	TURFING	2-14
2.30	AS-BUILT SURVEY	2-14
2.31	HANDING OVER OF PROPERTY TO JTC	2-14
2.32	MAINTENANCE	2-15
<b>SECTION 3 - TURFING</b>		<b>3-1</b>
3.1	TURFING	3-1
3.2	SUPPLY AND SPREADING APPROVED SOIL MIX (ASM)	3-1
3.3	SUPPLY AND FIXING OF TURVES	3-1
3.4	MAINTENANCE OF GRASS	3-2
3.5	GRASS CUTTING	3-2
<b>SECTION 4 - AS-BUILT SURVEY</b>		<b>4-1</b>
4.1	GENERALLY	4-1
4.2	SUBMISSION OF AS-BUILT SURVEY PLANS	4-1
4.3	DETAIL SPECIFICATIONS FOR AS-BUILT SURVEYS	4-2
4.4	SUBMISSION OF SURVEY DATA	4-3

## SECTION 1 - DEMOLITION WORKS

### 1.1 GENERALLY

- 1.1.1 The Lessee shall provide all necessary plants, equipment, labour and means to carry out demolition and clearance of vacant structures and illegal dumping within the Property.
- 1.1.2 The specifications and methodology in this Section 1 may change from time to time as required by JTC, to take into account (amongst other things) advancements in technology and developments in industry practices. The Lessee must ascertain the specific requirements of JTC before commencement of any work.
- 1.1.3 The Lessee shall ensure all of the works comply with relevant requirements of the standards and codes, statutory regulations and guidelines from Ministry of Manpower (MOM), National Environment Agency (NEA), Land Transport Authority (LTA), PUB (Singapore's national water agency), Building and Construction Authority (BCA), and their successors-in-title, and other relevant authorities.
- 1.1.4 The Lessee shall provide the following information to JTC prior to commencement of demolition works:-
- a. Topographical survey plan(s) showing the existing platform level of the Property, including buildings (first storey plan), driveway, landscape, etc.; and
  - b. Layout plan(s) of existing buildings, showing piling, footings, sub-structure, underground storage tank(s) or facility spaces.

### 1.2 DEMOLISHED MATERIALS

- 1.2.1 Except otherwise specified, all demolished material shall belong to the Lessee. The Lessee may salvage whatever useful materials he wishes and shall cart away from the Property all demolished materials and debris as the work proceeds and not to allow them to accumulate on the Property.

### 1.3 DEMOLITION OF EXISTING BUILDING STRUCTURES / MULTI-STOREY BUILDING STRUCTURES

- 1.3.1 For the demolition of main building structures and/or multi-storey building structures, the Lessee shall engage a Professional Engineer (PE) to study the conditions of the existing structures, including but not limited to, all superstructures and substructures, and propose the appropriate method(s) of demolition. Building structures to be demolished shall be adequately supported during demolition against uncontrolled collapse.
- 1.3.2 The PE engaged by the Lessee shall be responsible for applying to the Urban Redevelopment Authority (URA) for planning permission and subsequently submitting a formal application to the BCA, in accordance with the then prevailing Building Control Regulations for approval and permit to commence demolition works. Besides, the PE shall also be responsible for obtaining approvals from other authorities such as LTA, if necessary. The Lessee shall comply fully with the requirements imposed by the authorities. No demolition works shall commence unless necessary permits have been obtained from the

authorities. The Lessee shall comply with the procedures as detailed in Code of Practice for Demolition: SS 557 : 2010, or such other codes as may be prescribed by BCA. All demolition works shall be carried out in accordance to the approved plan(s) by relevant authorities.

**1.4 EMPLOYMENT OF PROFESSIONAL ENGINEER (PE), RESIDENT ENGINEER, RESIDENT TECHNICAL OFFICER**

1.4.1 The PE engaged by the Lessee shall be responsible for supervising and managing the demolition works. The PE shall employ a resident engineer or resident technical officer to supervise the works on a full time basis throughout the duration of the works if he is not able to be stationed at the Property full time. The resident engineer/technical officer is to be accredited with the Joint Accreditation Committee of the Institution of Engineers Singapore (IES) and the Association of Consulting Engineers Singapore (ACES).

**1.5 FOUL DRAINS / INSPECTION CHAMBERS/MANHOLES/SEPTIC TANKS**

1.5.1 The Lessee shall inspect the Property and identify all foul drains, inspection chambers and manholes, etc. which are of no further use and shall be demolished. The Lessee's PE shall submit the demolition plan to PUB or its successor-in-title for approval, indicating clearly the lines, chambers and manholes to be abandoned and removed/grouted. Upon PUB's approval, the Lessee shall remove/grout the abandoned lines, chambers and manholes, and backfill with suitable material to the existing platform level, followed by proper compaction.

1.5.2 The Lessee shall take all necessary precautions when digging up foul drain lines/inspection chambers/manholes to avoid any damage to the public sewer lines and other serviceable manholes. The upstream end of the remaining sewer is to be sealed, plugged off or grouted to the satisfaction of the PUB. Upon completion of the works, the PE shall submit the as-built plans to PUB and JTC for record.

**1.6 APRON DRAINS / DRAIN OUTLETS**

1.6.1 The Lessee shall inspect the Property and remove apron drains/drain outlets which are of no further use after the demolition of the buildings, and backfill with suitable material to the existing platform level, followed by proper compaction. The Lessee shall allow for the reinstatement of all the connections to the public drains. All precautions shall be taken to avoid any damage, ponding on the Property from rainwater and siltation release to the public drains.

**1.7 DISCARDED WELLS / PITS / UNDERGROUND FACILITY**

1.7.1 The Lessee shall remove all discarded wells, pits, underground tanks and facility, and backfill with suitable material to the existing platform level, followed by proper compaction.

**1.8 EXISTING PILES / FOUNDATIONS**

1.8.1 For building structures supported by pile foundation, the Lessee shall engage a Registered Surveyor with practising licence to locate the centre, type and size and the cut-off level of all the existing piles after the removal of pilecaps and prior to backfilling works. Photographs are to be taken for all the exposed piles.

1.8.2 Upon demolition of each block of the building, the Lessee shall compile, prepare and submit 4 sets of hardcopy and 2 sets of Autocad copy of the pile layout plan duly endorsed by the Registered Surveyor, and the PE indicating the pile centres, types, sizes, cut-off levels; and 2 sets of photographs of all the exposed piles to JTC for record.

1.8.3 Existing footings shall be removed with the demolition of the buildings.

## **1.9 DISPOSAL OF DEBRIS TO NEA'S DUMPING GROUND**

1.9.1 The Lessee shall cart away all debris as specified within the clearance areas and dispose them to the approved NEA's dumping grounds. All fees charged by NEA for the disposal of the debris etc. are to be borne by the Lessee.

## **1.10 ILLEGAL DISPOSAL AT THE PROPERTY**

1.10.1 Should it be found that the Lessee or his workmen with or without his knowledge illegally dumped the debris or materials that he is required to dispose off to NEA's dumping grounds or is found to have buried them on the Property, the Lessee will be required to remove and reinstate the affected area to the satisfactory of JTC.

## **1.11 CLEANLINESS OF THE DEMOLITION SITE**

1.11.1 The Lessee shall maintain the cleanliness of the whole area at all times and shall prevent unauthorised dumping at the Property. The whole area shall be kept in a hygienic, fire-risk free condition. Removal of all debris shall be complete and the site of each demolished structure tidied up on completion. All water-bearing receptacles of any description shall be removed and any stagnating pools of water filled in and levelled with earth. The Lessee shall not create health nuisance of any description on the Property and shall be held responsible for the immediate removal of such nuisance howsoever caused. Vehicles leaving the Property are to be thoroughly washed so as not to trail mud along the public roads.

## **1.12 PRECAUTION ON ADJOINING BUILDINGS**

1.12.1 The Lessee shall be responsible to take the necessary precautions to ensure the stability of adjoining buildings and roads, footpaths, etc., so that they are not endangered by the demolition works. The Lessee is required to study and predetermine where temporary supports, etc. will be required. Provisions shall be made for adequate shoring, strutting and bracing designed by the Lessee's PE.

1.12.2 The Lessee shall prepare a detailed statement with regard to the method, procedure, plant, tools and equipment which he intends to follow and/or use and the numbers, type of instrument and the frequency of monitoring, if any monitoring is required. During the execution of work, the Lessee is required to ensure the monitoring limits are not exceeded.

1.12.3 The Lessee shall include the weatherproofing of any surfaces of the adjoining buildings that are exposed by the demolition as required.

**1.13 NOTIFY AUTHORITIES CONCERNED**

- 1.13.1 Before commencement of work, the Lessee shall inform and check with the PUB, SP Power Gas, SP PowerGrid, Infocomm Media Development Authority (IMDA) or their successors-in-title, and other relevant authorities to ascertain the position of their respective existing services and whether such services need to be preserved. Should such services, required to be preserved, be damaged by the Lessee, he shall bear all cost of making good.
- 1.13.2 For substation within the Property, the Lessee shall also check with SP PowerGrid or his successors-in-title whether the substation can be decommissioned and demolished. The Lessee shall proceed to demolish the substation after consent is given by SP PowerGrid and/or decommissioning is carried out.
- 1.13.3 The Lessee shall arrange for the disconnection and the removal of all electrical, water and gas meters and other services if necessary and with consent from the relevant authorities.

**1.14 EXISTING SERVICES**

- 1.14.1 The Lessee shall engage licensed cable detection worker to ascertain and confirm that there are no live services cables before carrying out any excavation/demolition works.
- 1.14.2 The Lessee shall comply with all requirements of the various authorities in respect of the existing services at and in the vicinity of the Property. The Lessee shall also inform and liaise with the authorities concerned should he encounter any services at the Property, and arrange with and offer them all necessary assistance in ensuring the timely diversion, disconnection, or capping off of all utility services.

**1.15 RELIGIOUS ARTIFACTS**

- 1.15.1 The Lessee shall remove religious artefacts, effigies, altars, articles normally found or associated with temples, incense burners and the like found within the Property and dispose them including payment of fees as appropriate.

**1.16 VIBRATION/ DUST/ NOISE CONTROL**

- 1.16.1 Adequate measures shall be provided to control vibration, noise and dust to acceptable level stipulated by the authorities. The Lessee shall take special care for demolition of structures to ensure that no undue vibration and flying debris is caused, which could result in damage to other adjacent properties, MRT structures, pedestrian crossings, underground services or drains, etc.

**1.17 ASBESTOS REMOVAL**

- 1.17.1 Under the Workplace Safety and Health (Asbestos) Regulations which are administered by the MOM, any person who undertakes work involving asbestos must notify the Commissioner for Workplace Safety and Health at least 7 days prior to the commencement of such work. Employers including Lessee must conduct risk assessments and take measures to safeguard the health and safety of their workers as required under the Workplace Safety and Health (Risk Management) Regulations.

**SITE RETURN GUIDELINES FOR DEMOLITION, EARTHWORKS, TURFING, AS-BUILT SURVEY**

- 1.17.2 Prior to the physical removal of the asbestos materials, the Lessee shall carry out preparation of the asbestos work area by removing all movable objects to prevent contamination. The Lessee shall cover all immovable objects with polyethylene sheeting and demarcate the asbestos work area to prevent unauthorised access including warning signs.
- 1.17.3 The disposal of asbestos waste shall only be carried out by NEA approved asbestos disposal companies.



## SECTION 2 - EARTHWORKS

### 2.1 GENERALLY

- 2.1.1 The Lessee shall provide all necessary plant, equipment, labour and means to carry out the excavation, filling and compaction for the earthwork to the lines, limits and levels of existing platform level after the demolition works. The Lessee is required to carry out and complete all the works in this Section 2 at his own cost.
- 2.1.2 The specifications and methodology in this Section 2 may change from time to time as required by JTC, to take into account (amongst other things) advancements in technology and developments in industry practices. The Lessee must ascertain the specific requirements of JTC before commencement of any work.
- 2.1.3 The Lessee shall carry out all earthworks in such a manner as to prevent erosion or slips and shall limit working faces to safe slopes and heights. The Lessee shall ensure that all surfaces have at all times sufficient gradients to enable them to shed water without causing erosion.
- 2.1.4 The Lessee shall provide and maintain all necessary temporary access roads and shall divert, maintain and reinstate permanent drainage system. All temporary roads shall be provided with drainage ditches over its full length.

### 2.2 DATUM AND REFERENCE PEGS

- 2.2.1 Unless otherwise specified, the datum for heights shall be based on the Singapore Height Datum (SHD) of 0.000m, or such other heights, as defined under the Boundaries and Survey Maps Act (Chapter 25).
- 2.2.2 The Lessee shall be responsible for safeguarding the position and levels of all survey pegs and benchmarks used for the setting out of the works. The Lessee shall provide and maintain sufficient survey pegs at convenient locations and intervals for the checking and monitoring of the works.

### 2.3 HAULAGE ROUTES

- 2.3.1 Where the haulage routes are on public roads, the Lessee shall be responsible to apply to the Land Transport Authority (LTA), Traffic Police, Commissioner of Public Health or their successors-in-title and other relevant authorities for approval to use the roads.
- 2.3.2 The Lessee shall be responsible for all damages to the roads used by his earthwork lorries and shall maintain and rectify them to the satisfaction of the relevant authorities or shall pay the authorities for the proper maintenance.
- 2.3.3 The Lessee shall be responsible to keep the whole length of the haulage routes clean of all earth droppings and take all necessary action required to minimise and eliminate dust nuisance or slippery surfaces as required.

## **2.4 LICENSED CABLE DETECTION WORKER**

- 2.4.1 The Lessee shall engage a licensed cable detection worker to carry out the cable detection work before any excavation or levelling within the vicinity or area of any electricity cables belonging to the SP PowerGrid or his successor-in-title .

## **2.5 EXISTING PUBLIC SERVICES**

- 2.5.1 Before commencement of work, the Lessee shall inform and check with the PUB, SP Power Gas, SP PowerGrid, Infocomm Media Development Authority (IMDA) or their successors-in-title, and other relevant authorities and service providers to ascertain all existing public services found within their Property. These public services include water supply mains, power cables, gas mains and telecommunication cables, among others. The Lessee shall excavate trial holes to locate all such services before commencement of the earthworks.
- 2.5.2 The Lessee should ensure that the existing public services will not be damaged by his works, and shall submit to the relevant authorities and/or service providers for approval his proposal duly endorsed by a Professional Engineer (PE) for the protection of services and the safety measures to be implemented.
- 2.5.3 Liaising and submission to the relevant authorities and/or service providers including complying with their requirements shall be done by the Lessee and where professional endorsement is required, the Lessee shall source for his own PE.
- 2.5.4 It is the duty of the Lessee to inform all relevant authorities and/or service providers prior to carrying out any excavation works near such services. Lessee shall comply fully to the authorities and/or service providers' guidelines for executing their works to prevent any damage to the underground services.

## **2.6 DAMAGE TO UNDERGROUND SERVICES**

- 2.6.1 Should any cable or underground service be damaged, the Lessee shall cease all works at the location and immediately inform the appropriate authorities and/or services providers by the fastest means possible and to assist the authorities and/or services providers concerned wherever possible to restore the service.
- 2.6.2 The Lessee shall be responsible for all costs of repair, remedial measures including diversion if deemed necessary by the authorities and/or services providers and consequential losses as a result of the disruption of the service due to damage cause by him. The Lessee shall also liable to be prosecuted.

## **2.7 WASH BAYS**

- 2.7.1 The Lessee shall provide adequate wash bays for all exit points at the Property. The wash bays shall be so arranged that all vehicles must pass through the wash bays and have their tyres and chassis cleaned of all earth before going onto any public roads. The Lessee shall ensure that no silty water is discharged into existing water courses.
- 2.7.2 The portion of the road between the wash bay and public road must be paved. The public road at all the exit points must be constantly swept and washed clean.

## **2.8 WARNING SIGNS**

2.8.1 The Lessee shall provide, erect and maintain warning signs, in the different official languages, at all entrances and exits to the Property. Such signs shall include **NO TRESPASSING, DANGER - HEAVY EARTH-MOVING VEHICLES MOVING AHEAD, DANGER WORK PROPERTY ENTER AT YOUR OWN RISK, DANGER - KEEP OUT**, etc.

## **2.9 SITE CLEARANCE**

2.9.1 Before commencement of site clearance, the Lessee shall submit the layout and species of trees to be felled within their Property for NParks' and JTC's approval. The Lessee shall provide adequate protection to the trees that are identified to be preserved by NParks and JTC. The Lessee shall carry out final round of pruning to the trees before handing over of Property to JTC.

2.9.2 The Lessee is responsible to clear away all other shrubs, trees, bushes, roots and other obstructions on the Property before carrying out the earthwork proper.

2.9.3 The stumps and roots of trees to be removed shall be grubbed up and removed from the Property. All empty tree holes or cavities shall be filled with suitable materials to the existing platform level, followed by proper compaction. All bushes, shrubs, roots, lallangs, bamboo etc. shall be removed by cutting and/or digging and the accumulations shall be removed from the Property as works progress and be disposed off to NEA's approved dumping ground.

## **2.10 PROPERTY PROTECTION**

2.10.1 Property Conditions and Restrictions

2.11.1.1 In the event that there are other contractors of other authorities, government/statutory bodies or stakeholders working in the same area, the Lessee is responsible for restricting his workmen from entering the property of other stakeholders in and around the vicinity of the Property and taking all necessary precautions to prevent any trespassing and damage arising from nuisance of any kind. Warning lights and signs are to be installed in conspicuous positions and operated as required. The Lessee shall ensure that there is no interference with the works such that their work progresses in a smooth and satisfactory manner.

2.11.1.2 The Lessee shall confine the work activities including storage of construction materials, movement and packing of equipment, machinery and plants, stockpiled of excavated material within the Property. The Lessee shall execute his works in such a manner as to cause minimum inconvenience to the public and other parties. The Lessee shall control his workforce to ensure that workers do not loiter in public areas or facilities. The Lessee shall make suitable provisions and shall control vehicles that provide transport for the work force and/or all other vehicles to the Property so that roads are not blocked and there is no disturbance to the community.

2.11.1.3 The Lessee shall comply with all requirements of NEA or his successor-in-title, including ensuring that regular maintenance of the Property is carried out to prevent the breeding of mosquitoes, pests and rodents.

2.10.2 Protection of the Property

- 2.11.2.1 The Lessee shall ensure that the surroundings and existing services within the Property including trees and vegetation are protected against any damage which may arise from the performance of the works. In the event temporary protection measure is needed to protect the existing services, the Lessee shall engage his own PE to carry out all the necessary temporary protection work calculation and proposed measure. The Lessee shall also take all necessary precaution not to disturb the surrounding neighbourhood and shall provide all necessary safety measures to ensure the safety of the public.

## **2.11 DUST NUISANCE**

- 2.11.1 The Lessee shall be responsible to ensure that his method of executing the works shall not create dust nuisance during the dry season. The Lessee shall have adequate water wagons to water the haulage roads regularly to help minimize the dust nuisance. All vehicles must travel at a slow speed to avoid kicking up dust.

## **2.12 EXISTING AND TEMPORARY DRAINS**

- 2.12.1 The Lessee shall be responsible to ensure that existing drainage systems are kept clear and free flowing at all times. The Lessee shall carry out emergency works, at his own expenses, should his work cause any blockage or choke up any existing drain or water courses directly or indirectly.
- 2.12.2 The Lessee shall excavate and maintain all temporary surface and subsoil drains, at his own expenses, including any diversion or pumping necessary to prevent flooding. Prior approval from PUB must be obtained before any diversion is carried out. Any drain so diverted shall be reconstructed to their original position and condition on completion of the work all at the Lessee's own expenses.
- 2.12.3 The Lessee shall engage a Qualified Erosion Control Professional (QECP) to design, implement and monitor earth control measure (ECM) plan at the Property in accordance to the requirements of PUB or his successor-in-title. The ECM plan shall include provision of the necessary cut-off drains and silt traps, etc. to prevent siltation of existing drains and the surrounding, among others.
- 2.12.4 The Lessee shall be responsible for any claims or suits that may arise as a result of damage due to flooding caused directly or indirectly by his work.

## **2.13 TEMPORARY CROSSINGS**

- 2.13.1 Where the haulage routes cross any drain, stream, canal or river, the Lessee shall, at his own expense, provide the appropriate temporary crossings/bridge for his earth moving lorries and plants.
- 2.13.2 The Lessee shall engage his own PE to design and supervise the erection of such temporary crossings and to certify as to their structural stability and adequacy.
- 2.13.3 The Lessee shall be responsible to liaise with PUB, LTA, or their successors-in-title and other relevant authorities for the necessary approval or permit for the crossing/bridge, pay all necessary fees and comply with all stipulated conditions. The drain is to be kept in a free flowing condition at all times.

2.13.4 On completion, the temporary crossings, including piling, are to be completely removed and the site reinstated to PUB's and/or LTA's satisfaction.

## **2.14 EARTH SLOPES**

2.14.1 Unless otherwise specified, all proposed slopes shall be:-

- a. For vertical heights of slope less than 1m, 1 vertical to 1.5 horizontal;
- b. For vertical heights of slope between 1m to 3m, 1 vertical to 2 horizontal;
- c. For vertical height of slope exceeding 3m, benching of 3m wide and concrete cut off drain along the benching and cascading drains are to be provided, or such other measurements as JTC may decide from time to time.

2.14.2 Notwithstanding the above, the Lessee shall provide necessary protective measures to ensure the stability of slopes during the whole duration of the construction period and in the long term if relevant.

2.14.3 In all cuttings, undulations in the general plane of the slope will not be permitted. Any overhanging, loose or unstable materials, whether outside or behind the specified slope, be removed. The top edges of cutting shall be neatly rounded. The cutting or excavation shall be so arranged that the working areas are adequately drained throughout the period of construction.

## **2.15 TOLERANCE OF FILL**

2.15.1 Unless otherwise specified, the tolerance of the fill level or those on slope shall not be more than 150mm from the existing platform level, or such other distance as JTC may decide from time to time.

2.15.2 Notwithstanding the above, all cut or fill area shall be such that there is no stagnation of water. Should there be any local depressions, the Lessee shall be required to regrade or fill up the depressions as necessary.

## **2.16 FILLING GENERALLY**

2.16.1 All streams, depressions with water, puddles, ponds and the like shall be effectively drained prior to filling work.

2.16.2 In area where filling is to be done over poor sub-soil, the Lessee shall be required to take proper measures to minimize sub-soil failure or movement and shall rectify any damage at his own expenses.

## **2.17 IMPORTED FILLING MATERIALS**

2.17.1 Imported filling materials must be approved materials acceptable in accordance with this Specification.

**2.18 UNSUITABLE MATERIALS**

2.18.1 Unsuitable materials shall mean other than the then prevailing industry approved materials and shall include:

- a. materials from swamps and riverbeds
- b. peat, marine clay, logs, stumps and perishable material
- c. materials susceptible to spontaneous combustion
- d. soil of liquid limit exceeding 70 and/or plastic index exceeding 35
- e. materials having a moisture content greater than the maximum permitted for such materials
- f. construction debris
- g. contaminated materials with heavy metals which do not comply to the then prevailing Dutch Pollution Standards. The current Dutch Pollution Standards are (as at 2020):

Heavy Metal	Dutch Intervene Level (DIV), mg/kg
Antimony	22
Arsenic	76
Barium	920
Cadmium	13
Chromium III	180
Chromium VI	78
Cobalt	190
Copper	190
Mercury (inorganic)	36
Mercury (organic)	4
Lead	530
Molybdenum	190
Nickel	100
Zinc	720
<b>Others</b>	
TPH	5000

**2.19 FILLING**

2.19.1 Unless otherwise specified, for general earthwork, filling by end tipping is permitted. Filling shall be built by spreading materials in successive layers not exceeding 1m or such other dimension compatible with the compaction plants used.

**2.20 COMPACTION**

2.20.1 Earthmoving plants shall not be accepted as compaction equipment.

2.20.2 All materials shall be compacted in layers as soon as possible after deposition. The depth of each compacted layers shall be compatible with the compaction plants used and shall not be greater than the maximum depth specified for each type of compaction plant.

2.20.3 The moisture content of the in-situ material during compaction shall be maintained as close as possible to the optimum moisture content. If necessary, this shall be adjusted by wetting or drying on site to enable the required in-situ field densities of the fill materials to be obtained consistently.

2.20.4 All backfilled areas shall not show signs of settlement when accessed by construction plants or equipment.

## **2.21 FILLING OF FOUNDATION PITS AND TRENCHES**

2.21.1 Unless otherwise specified, all fillings for this purpose shall consist of the then prevailing industry approved materials deposited and compacted by the then prevailing industry approved plants according to this Guideline. Timber sheeting and other excavation supports shall be carefully removed as the filling proceeds.

## **2.22 FILLING IN EMBANKMENTS**

2.22.1 End tipping shall not be permitted. Filling to embankments shall be carried out in even horizontal layers over the whole width, laid in thickness appropriate to the compaction plant used and compacted to the stipulated requirements. At all times the embankment shall be maintained with a sufficient camber and a surface sufficiently even to enable surface water to drain readily from them. Unless otherwise specified, the top edges of the embankments shall be neatly rounded.

## **2.23 FILLING ADJACENT TO CULVERTS AND RETAINING WALLS**

2.23.1 Before backfilling, a filter drain shall be placed against weepholes in all structures. The filter drain shall consist of clean, hard and durable broken stones or hardcore. The larger stones shall be placed adjacent to the weepholes and the smaller particles behind and above the larger particles. The filter drain shall extend horizontally throughout the whole length of the structure with maximum cross section of 300mm by 300mm, or such other dimensions as required by JTC.

2.23.2 Special filling materials, passing a 75mm BS sieve with liquid limit not exceeding 35, plastic index not exceeding 12, coefficient of uniformity greater than 10 and percentage passing 75 mm BS sieve not less than 20% by weight, or such other dimensions or standards as required by JTC, shall be placed adjacent to all structure. Backfill shall then be placed in horizontal layers of thickness appropriate to the compacting plant used.

## **2.24 FILLING INTO PONDS**

2.24.1 The Lessee shall cut the necessary drains or use other means to drain or pump out all water from the ponds before filling.

2.24.2 The Lessee shall be required to demolish and remove any weir or sluice structures of whatever type of construction found at the pond or filling area and shall dispose of the debris appropriately.

**2.25 FILLING INTO SWAMPS AND NEXT TO RIVER BANKS**

- 2.25.1 The Lessee shall be required to exercise great care and caution when filling into swamps or at river banks or any existing waterways that need to be kept open and free flowing. Unless otherwise specified, the Lessee shall be responsible to cut grub and remove the mangrove and other vegetation growing in the swamp or river bank before commencing filling.
- 2.25.2 The Lessee shall be solely responsible for any slip, upheaval or slope failure and shall take immediate emergency measures to dredge and clear any blockage to ensure a free flow of water and shall make good the slope.
- 2.25.3 The Lessee shall be responsible for any claims or damages or flooding to the surrounding areas arising from his work.

**2.26 FILLING AT SEAFRONT**

- 2.26.1 The Lessee shall arrange for the earthwork to be carried out in layers such that the initial layer is deposited during low tide and spread evenly to form a gentle slope towards the sea. The earth shall be end tipped at the top and bulldozed in layers. Each successive layers are to be laid in a staggered pattern at intervals so that the pore water pressure in the underlying layers can dissipate to minimize slope failure, slips upheaval or mud wave.
- 2.26.2 Any slip upheaval or filling beyond the proposal limits of fill shall be dredged back to the required slope at Lessee's own expenses.

**2.27 GROUND FAILURE**

- 2.27.1 When filling in area where the sub-soil is poor, the Lessee is to proceed continuously and top up the area in thin layers and allow sufficient time for dissipation of excess pore water pressure in the underlying layers until the filling is done to the required lines, limits and levels.
- 2.27.2 Should the filling cause upheavals or mud waves etc., the Lessee shall be required to dredge, at his own expenses, all such upheaved area to ensure that there is a minimum of 1m (or such other dimension as required by JTC) thick of the then prevailing industry approved fill at the surface measured from the final proposed level.
- 2.27.3 Unless otherwise specified, the excavated materials may be allowed to be dried and made use of in sandwiched filling at the deeper portion of the filling area if the PE considers applicable, otherwise the Lessee shall remove the material from the Property to a dumping ground approved by the relevant authorities.
- 2.27.4 If the ground shows tension cracks or other signs of imminent failure, the Lessee shall take immediate action to stop further filling in the area and to repair the cracks, or depression. No filling will be allowed in the area until it is ascertained that the pore water pressure had been dissipated and safe to resume.

**2.28 SETTLEMENT**

- 2.28.1 The Lessee shall allow for all settlement, shrinkages, consolidation and reduction in levels, localised depressions and the like.



2.28.2 The Lessee shall be responsible for making good all settlements or erosion in the filling and cut area whenever the defects occur up to the successful handing over of the Property to JTC.

**2.29 TURFING**

2.29.1 The Lessee is to treat all bare surface and embankment slopes with close turfing.

2.29.2 The Lessee is required to commence turfing progressively as the slopes are formed so that the area can be protected at the earliest possible date. The Lessee is to maintain the turf and replace any dead ones.

**2.30 AS-BUILT SURVEY**

2.30.1 The Lessee shall provide all the necessary labour, tools, equipment and pegs for the joint surveys, resurveys, etc. The Lessee shall submit the as-built survey plans **within four (4) weeks** from the completion of demolition works and/or earthworks.

**2.31 HANDING OVER OF PROPERTY TO JTC**

2.31.1 The Lessee shall arrange for a joint inspection with JTC after the as-built survey plans showed that all works are cut or filled to the proposed levels, lines and limits and properly compacted, and close turfing completed, all as deemed satisfactory by JTC.

2.31.2 During the joint inspection, the Lessee shall provide all necessary plants, equipment, labour and means to carry out trial pits in order for JTC to verify the quality of backfill materials. The depth of trial pit shall be 2m or equal to the depth of backfill (at locations with sub-structure, underground tank or facility spaces previously), whichever is deeper.

2.31.3 The number of trial pits shall be in accordance to the requirement below, or such other requirement as decided by JTC:

<b>Land Area, A (hectare)</b>	<b>One trial pit for every</b>
≤ 1	1,000 m <sup>2</sup>
1 < A ≤ 2	1,600 m <sup>2</sup>
2 < A ≤ 3	2,000 m <sup>2</sup>
3 < A ≤ 4	2,500 m <sup>2</sup>
> 4	3,000 m <sup>2</sup>

2.31.4 The Lessee shall also take one soil sample from every trial pit and send it to accredited testing laboratory for testing on the following parameters, or such other parameters as required by JTC, at Lessee's cost:

- a. moisture content, plastic limit, liquid limit and heavy metal(s) in accordance to the list in the then prevailing Dutch Standard for all soil samples collected from the trial pits; and
- b. spontaneous combustion for suspicious materials

2.31.5 The soil samples shall be collected by accredited laboratory or delivered by the Lessee to the accredited laboratory under JTC's escort immediately after the joint inspection.

2.31.6 The Lessee shall then prepare the trial pit report with location, dimension and photographs of trial pits properly recorded and submit the report as well as the laboratory report for the soil samples to JTC for approval **within three (3) weeks** from the date of trial pit inspection. JTC will only take over the Property when the trial pit and laboratory test results are satisfactory. The Lessee shall be responsible to rectify any non-conformance to JTC's satisfaction at his own costs.

## **2.32 MAINTENANCE**

2.32.1 The Lessee shall maintain the earthwork cut and fill area, maintain all temporary drains and retained vegetation, trees, turf etc. and desilt all silt traps regularly until the successful handing over of Property to JTC. The retained trees shall be mulched with the then prevailing industry approved organic matter at the tree base. Rectification work as required shall be carried out as and when directed by JTC.

## SECTION 3 - TURFING

### 3.1 TURFING

3.1.1 All turfing works shall be carried out to the satisfaction of JTC. All works in connection shall be considered accepted, only upon the successful handing over of the Property to JTC. The Lessee is required to carry out and complete all the works in this Section 3 at his own cost.

3.1.2 The specifications and methodology in this Section 3 may change from time to time as required by JTC, to take into account (amongst other things) advancements in technology and developments in industry practices. The Lessee must ascertain the specific requirements of JTC before commencement of any work.

### 3.2 SUPPLY AND SPREADING APPROVED SOIL MIX (ASM)

3.2.1 The Soil Media / Mixture used for general turfing must comply with the guidelines specified in the latest edition of National Parks Board's CUGE's publications, "Specifications for Soil Mixture for General Landscaping Use".

3.2.2 The component of ASM, generally to be used for turfing shall be in the ratio 3:2:1 of loamy soil, compost and washed sand, respectively. The proportions are by volume. The ASM shall be clear of all lumps of clay, debris, stones, rubbish, hazardous materials, and roots.

### 3.3 SUPPLY AND FIXING OF TURVES

3.3.1 For general turfing works, the turf to be supplied shall be Axonopus Compressus, also known as cow grass or football field grass, or such other turf as required by JTC. The grass shall be planted for close turfing to the whole Property.

3.3.2 The area/ground to be turfed shall be clean weeded and all weeded materials, together with stones, wood, rubbish and other undesirable excavated materials, shall be removed and deposited in the dumping grounds approved by the relevant authorities. The ground shall be levelled until uniform to prevent water stagnation and future sinking of the ground.

3.3.3 All turves supplied by the Lessee shall be of healthy and vigorous stock from the then prevailing industry approved sources. All turves supplied shall be free from weeds, especially Mimosa Pudica, and Imperata Cylindrica (lallang) and care shall be taken to include as much of the root growth as possible.

3.3.4 Turves shall be laid side by side on the ground. In the case of banks or slopes, each sod shall be held in position by wooden pegs to prevent movement or displacement of any kind, and the turfing shall thereafter be tamped down and rolled (except on slopes) with a suitable hand roller. The pieces of turf shall be sunk into the ground so that they are flush with the surface. All depressions between the pieces of turf shall be filled with topsoil. The turfing shall on completion present a uniform and regular appearance.

3.3.5 Final Finished level must be level with the existing platform level.

**3.4 MAINTENANCE OF GRASS**

- 3.4.1 Grass shall be close cut as short as possible following the general contours of the ground.
- 3.4.2 Where the existing ground is around established and mature tree (with girth of above 200mm measured at 1m above ground level) or around street furniture, the Lessee shall level the surrounding ground and employ manual grass cutting machine operated by nylon string cutting blade, to close cut the grass right up to the bases of trees or street furniture without damaging the bark or furniture.
- 3.4.3 All cut grass, cuttings together with trimmings, loose stones, rubbish etc. shall be collected and removed from the Property and disposed off expeditiously to the NEA's approved dumping grounds.

**3.5 GRASS CUTTING**

- 3.5.1 The Lessee shall carry out one final round of grass cutting for established turf area just before the handing over of the Property to JTC.

## SECTION 4 - AS-BUILT SURVEY

### 4.1 GENERALLY

- 4.1.1 The Lessee shall be required to submit to JTC the as-built survey plans for the handing over of Property to JTC. The Lessee is required to carry out and complete all the works in this Section 4 at his own cost.
- 4.1.2 The specifications and methodology in this Section 4 may change from time to time as required by JTC, to take into account (amongst other things) advancements in technology and developments in industry practices. The Lessee must ascertain the specific requirements of JTC before commencement of any work.
- 4.1.3 The Lessee shall be required to carry out the as-built survey for the completed works prior to preparation of as-built survey plans. All as-built survey works shall be carried out under the direct supervision of the Registered Surveyors engaged by the Lessee. A Registered Surveyor refers to a person registered as a Land Surveyor under the Land Surveyors Act and holding a valid practicing certificate. The Registered Surveyor shall ensure that the as-built surveys are fully complied with the Land Surveyors Board Singapore's LSB Directive on Engineering & Hydrographic Survey Practices. For as-built survey of all underground structures constructed such as manholes, drain and sewer and underground utilities laid such as sewer pipes, water pipes, gas pipes, telecommunication cable, electricity cable, etc., the Registered Surveyor shall comply fully with the latest 'Standard and Specifications for Utility Survey in Singapore' which is available on Singapore Land Authority webProperty (URL: <http://www.sla.gov.sg/Press-Room/Circulars/Land-Survey/>).
- 4.1.4 The Registered Surveyor shall ensure that all field surveyors are qualified to undertake such survey works. The Registered Surveyor shall also be required to endorse on the as-built survey plans submitted to JTC.

### 4.2 SUBMISSION OF AS-BUILT SURVEY PLANS

- 4.2.1 The Lessee shall be required to submit to JTC, four set of as-built survey plans in hard copy and two sets in soft copy (CAD and/or GIS format), duly endorsed by the Registered Surveyor engaged by him, and other deliverables, in accordance with the format as specified and approved by JTC.
- 4.2.2 JTC reserve the right to check and comment on the as-built survey works carried out by the Registered Surveyor and the as-built survey plans submitted by the Lessee, as he deems fit and necessary to ensure that the works carried out are complied with the Specifications. The Lessee and the Registered Surveyor shall be required to attend to all queries and rectify all errors **within two (2) weeks** from the date of written notification by JTC. All cost and expenses for rectification shall be borne by the Lessee. In the event that the Lessee fails to attend to the queries and rectify the errors within the stipulated time after JTC's written notification, JTC reserves the right to engage another registered surveyor or JTC's surveyor to do the works without further reference to the Lessee, in which case, all cost and expenses and 20% of administrative charge will be recovered by JTC from any monies due and payable to the Lessee under the Contract.

### **4.3 DETAIL SPECIFICATIONS FOR AS-BUILT SURVEYS**

#### **4.3.1 Features to be Picked**

##### **4.4.1.1 The features to be picked during as-built survey are summarised as follow:**

- a. All entrance and exit
- b. Retaining structures
- c. Edge of cut-off drains
- d. Details of drains e.g. steps, channels
- e. All old drain details that are connected to the new drains (the extent to pick up will be 20m from the new drain or as directed by JTC).
- f. All inverts (including sumps and beneath iron gratings) and back drop levels
- g. All sumps and iron gratings
- h. All inlets and outlets connecting the subject drain(s)
- i. Sewer manholes and/or inspection chambers and dimensions
- j. All top, invert and back drop levels of sewer manholes
- k. All inlet and outlet pipes (levels and details) connecting to manholes (including sizes e.g. diameter)
- l. All manholes and/or inspection chambers and dimensions
- m. All top, invert and back drop levels for all manholes
- n. Gas pipe, valve, indicator, meters and mains
- o. Water pipe, air valve, mains, meters and indicators
- p. Telcos manholes, manholes dimensions and cables
- q. Electric boxes and cables
- r. Trees with names of species (approved abbreviations, as specified by JTC, for the names shall be used), heights and girth sizes
- s. Any other details and features that are specified by JTC

##### **4.4.1.2 Reinstated platform and As-Constructed Cut-Off Drains**

- a. The cross sections details shall contain levels of reinstated platform and invert levels of cut-off drain or coping levels and any other levels as specified by JTC.
- b. If there are adjoining existing drains, cross sections of the drains and part of the longitudinal section of the adjoining drains (of up to 20m or as specified by JTC) and/or cross sections of the existing drains are required. The Registered Surveyor shall indicate which sections of the cross sections are existing drains and vice versa.
- c. The longitudinal section details shall contain top slab levels or coping levels, invert levels of drains, drain sizes, drainage gradients, piling information such as sizes, spacing and penetration length etc.

#### **4.4 SUBMISSION OF SURVEY DATA**

- 4.4.1 The Lessee is required to submit a complete set of verified survey data and plans in:
- a. Hardcopy – 4 sets
  - b. Softcopy (in compact disk) – 2 sets
- 4.4.2 Hard copy information, as listed below, of the surveyed corridor are to be submitted as one complete set standard sheets of 1189mm x 841m (A0 size) paper prints. The scales used for the hardcopy submission are as stated below unless otherwise specified by JTC.
- 4.4.3 Digital survey data in three dimensional (3D) CAD and/or GIS format drawing files shall be supplied by the Registered Surveyor.
- 4.4.4 In addition, field observations, adjusted results and control points established for the works, computation sheets, immediate drawings and other relevant documents for example reference Certified Plans and PLBM sketches, etc. are to be submitted. Field notes, sketches and total stations reduction sheets should be properly annotated, endorsed and dated by the Surveyor. All field bookings and sketches must be tidy and presentable.