

Sustainable Construction

ACBA5012



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Contents

Introduction.....	3
Legislation.....	4
Construction Method.....	4
Guidance / Assumptions	4
Assumptions;.....	4
Guidance	4
Waste Identified	5
Excavation.....	5
Basement.....	5
Foundation	5
Superstructure	5
Cladding	5
Reduction of waste.....	5
Reuse/Recycling of waste	6
Reuse.....	6
Recycling	6
Additional Works	6
Identification of dealers and destination	6
Implementation	7
Monitoring and review	7
Appendix.....	7
Bibliography.....	8

Introduction

A site waste management plan (SWMP) is meant to encourage the effective management of waste during the full construction phase of a project. It should aim to promote the reduction of waste and save materials. 'The UK construction industry is the largest consumer of resources, requiring more than 400 million tonnes of material a year' (Davis, 2018). Due to this massive amount of material required each year, a strategy was announced in order to try and combat this and try and make construction a more resourceful sector of work.

The benefits of a SWMP;

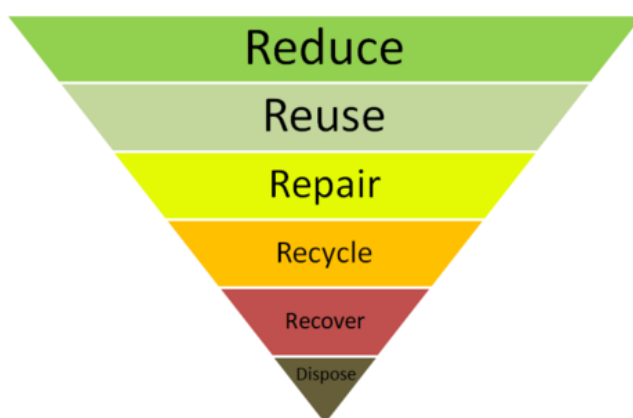
- Time Saving – Easy access to queries from your environmental regulator
- Help Avoid prosecution – waste is disposed of legally
- Win new Jobs – Proof of environmental performance
- Reduce waste disposal costs – understand how waste is managed to save money and reduce costs
- Enhance reputation – Client can see environmental impact (tender submission)
- Reduce Environmental impact – 'Greener' Construction
- Improve future projects – Gather information for future projects

(Northern Ireland Environment Agency)

A Site Waste Management Plan will contain;

- A designated person who is responsible for resource Management
- List of what types of waste will be generated from construction
- How waste will be managed (reduced, re-used or recycled)
- Which contractors/waste management companies will be used to ensure the waste is correctly disposed of/ recycled responsibly and/or legally.
- How the quantity of waste generated by the project will be measured

In this report I will follow the hierarchy of waste and aim to reduce disposal of materials as much as physically possible.



(What Plastic, n.d.)

Legislation

Site Waste Management Plan Regulation 2008 was put to the UK parliament on 15th February 2008 and came into full effect on 6th April 2008. This legislation came into place for all projects that exceeded £300,000.00 and placed further requirements on projects that exceeded £500,000.00 (UK Government, 2008). Initially the responsibility of the plan was accounted to the client and must have been in place prior to commencing on site. If work on site commenced without one of these in place they would be both be guilty of an offence under the act. The environment agency or council enforcement officers will enforce this legislation. A person found guilty could receive an unlimited fine on indictment while if a corporate body is guilty, individual liability can apply to directors. (M, 2008). Despite this, it was removed as legislation in 2013 although this is still common practice in some workplaces.

Construction Method

The construction method required for this project would be as follows;

- Piled foundations with a reinforced steel raft to support the 20 story building above.
- Basement to have prefabricated concrete panels installed inside the piling and with water-proof tanking membrane
- 10m excavation 9m basement 1m raft
- Steel framed structure (5x5)
- Pre cast concrete intermediate flooring
- Metsec infill panels with pre fabricated render board on the external. Blown in insulation internally. Timber batten externally to carry insulation
- Rain screen cladding external.

Guidance / Assumptions

Assumptions;

- 14 meter piled foundation would be adequate to reach bedrock for the piles.
- Basement depth of 9 metres (3m per floor)
- Excavation would only result in soil waste without contamination
- 5 x 5 steel frame with intermediate prefabricated concrete slab floor
- Blown insulation would result in zero waste
- All bearers/pallets that panels are brought in on are to be arranged for removal with the supplier
- All packaging agreed to be removed by the supplier or provided without any packaging. Cladding secured by lorry straps

Guidance

Derwen group regarding skip hire (Derwen, 2018)

Reading on reducing construction waste (WRAP, n.d.)

Getting results for bulking factors of concrete and soil (Engineering Toolbob, n.d.)

Waste Identified

Excavation

Soil – 17.05.04

Concrete – 17.01.01

Origin – Site strip and foundations

Basement

Concrete – 17.01.01

Tanking membrane - 17.02.03

Origin- remainder left over from forming basement and excess tanking membrane for waterproofing

Foundation

Concrete – 17.01.01

Steel – 17.04.05

Origin – Remaining material ordered for foundations

Superstructure

No waste identified – prefabricated offsite ready to install

Cladding

Cardboard - PWRS

Plastic packages – PWRS

Origin – Purely packaging from cladding.

Reduction of waste

Reduction of waste from inception to construction;

Foundations/Basement – Firstly we will carefully order materials used to as close as we can to the actual amount. We will ensure this by completing accurate measures of the slab and basement areas. We will also used pre fabricated concrete panels to basement wall areas again to reduce materials significantly instead of cast onsite. We will also ensure accurate take offs of tanking membrane is completed again to reduce materials wasted although this would be minimal.

Superstructure – The superstructure would also be prefabricated off site. The steel frame would be made to measure in exact lengths. No site cutting. Infill panels to the steel would be Metsec with a render board on the external and timber batten to carry the cladding. Insulation would be blown in on site on the internal but there would be no wastage with this method. Constructing the building this way would ensure that the superstructure was built without producing a single piece of waste (In theory). The pallets/bearers that the panels would be transported on would be retuned on the following delivery to the supplier

Cladding – Cladding Is difficult as it will come in packaging. I will arrange with the supplier to try and ensure that the packaging is minimal, recyclable if possible. This way I ensure that waste is reduced to the absolute minimum.

Reuse/Recycling of waste

Reuse

In order to get some of the materials reused, again I will arrange with the suppliers of the prefabricated panels that pallets etc will be returned on their transport free of charge in order for them to be reused. I have also spoke with Derwen who will be removing our wastage that the concrete skip will be ground down and used as aggregate so this can be reused in other construction projects or in building retaining walls that would be situated around site or if required in basement areas pending engineers report. We would also use some of the soil for landscaping so not all of our soil is classified as waste.

Recycling

On this site I will implement a strict recycling policy that we must check if its possible to be recycled before sending to landfill. Food waste in the canteen will be picked up by the local council and used for compost. Also, cardboard that has been sent to site will be sent with Derwen for recycling. Standard council recycling bins will be available around site in order to provide this service and free removal from the council.

Additional Works

Although not required as part of this report a few more things that I would complete if required; All areas e.g plasterboard windows etc to be standard sizes to reduce site cutting and therefore waste. Ensure a designer was on board early to be able to develop this through the inception phase of a project.

Identification of dealers and destination

See Appendix 1

Implementation

To ensure that this report is implemented I will make sure every working member on site receives the appropriate training.

On site everyone should be aware of;

- The site waste management plan
- Roles and responsibilities of all contractors
- The procedure of removing waste – which skips to use
- Be aware of hazardous waste
- Know where to store materials

I will ensure that these are completed on site induction and if they need to be updated to include this in tool box talks prior to commencing on site.

Training logs will be kept to ensure that there is a record of completion.

Monitoring and review

To ensure that this action plan is followed we will monitor it weekly and ensure all actions are recorded and carried out. We will review and produce an actual vs Forecast waste comparison in order to keep track and ensure we are carrying it out correctly. On completion we will review and record any deviation from the original plan.

(SMARTWaste Plan, 2008)

Appendix

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Identification of dealers and final destination

Type of Waste	Total Volume	Total Mass	Dealer	Final Destination
Concrete	947.12	1818.47	Derwen	20% recycle- 80% landfill
Soil	8712.61	8712.61	Derwen	30% landscaping - 70% landfill
Steel	45.00	1.07	Derwen	Recycled
Pallets/Bearers	0.00	0.00	Supplier	Returned & reused

Cost when No reuse / recycle

Type of Waste	mass	Skips	Cost per Skip	Total Cost
Concrete	1818.47	228.00	£100.00	£ 22,800.00
Soil	8712.61	1090.00	£50.00	£ 54,500.00
Steel		0.00	£0.00	£ -
Pallets/Bearers	0.00	0.00	£0.00	£ -
			Total:	£ 77,300.00

Type of Waste	mass	Skips	Cost per Skip	Total Cost
Concrete	1454.78	182.00	£100.00	£ 18,200.00
Soil	6970.08	872.00	£50.00	£ 43,600.00
			Total:	£ 61,800.00

Saving for reusing/recycling: £	15,500.00
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Based on Juans figures as unable to ascertain quote at this time

8m3 per skip

Workings

Concrete

Piles

60 piles per side 500mm diameter

$0.25(\text{squared}) \times \text{PI} \times 1 \text{ meter (presumed depth of concrete car park)}$

$\times 240 \text{ piles}$

$= 47.12\text{m}^3$

Slab

$30 \times 30 \times 1$

$= 900\text{m}^3$

$900 + 47.12\text{m}^3 = 947.12$

$947.12 \times 2.4\text{t/m}^3$

$= 2273.09 / 1.25$

$= 1818.47$

Soil

piles

$0.25(\text{squared}) \times \text{PI} \times 13 \text{ meters} \times 240\text{piles}$

$= 612.61$

Slab

$30 \times 30 \times 9$

$= 8100$

$+ 612.61$

$= 8712.61 \times 125\%(\text{bulking factor})$

$= 10890.76 / 1.25$

$= 8712.61$

Steel

$45\text{m}^2 \times 0.010$

$0.45/0.42 = 1.07$

20% taken off mass to work out saving when waste is recycled/reused

